MODERN Machine Shop

REG. U. S. PAT. OFF.

A MAGAZINE FOR MACHINE SHOP EXECUTIVES

Published monthly at 128 Opera Place, Cincinnati, Ohio

DON G. GARDNER, *Publisher and Gen. Mgr.* HOWARD CAMPBELL, *Editor.*

Vol. 2 **DECEMBER, 1929** **No. 7**

CONTENTS

Page

NAVAL MAINTENANCE OPERATIONS AT THE BOSTON NAVY YARD 9
By Howard Campbell

APPRENTICE TRAINING METHODS AT THE BEECH GROVE SHOPS 16
By August Jacob

AIRCRAFT WELDING, INCLUDING DEVELOPMENT OF AN EFFICIENT WELDING DEPARTMENT 24
By Russell F. Hardy

PREVENTING DECARBONIZATION IN AN ELECTRIC FURNACE 30
By R. H. Kasper

THIS WISCONSIN TOOL SHOP HAS A SIDE LINE 32
By Philip Winter

TAKING INVENTORY 40
By J. J. Berliner

IDEAS FROM READERS 58
—BELL-MOUTHING ATTACHMENT, *By A. R. Kling*
—A POWER HACKSAW "KINK," *By R. H. Kasper*
—GUMMED LETTERS FOR TRACINGS, *By Roswell Kent*
—MODERNIZING AN OLD MACHINE, *By M. J. Kunert*
—CENTERING BROKEN STUDS, *By Richard H. Kiddle*

EDITORIALS 64
—IN THE COLD GRAY DAWN
—"CHIEF ENGINEER"

NEW SHOP EQUIPMENT 66
"INFORMATION WANTED" CHECKING PAGE 94
FOR YOUR CATALOG LIBRARY 96
THE SCRAP PILE 104
INDEX TO ADVERTISEMENTS 106

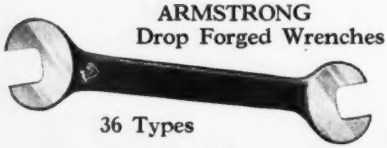
Guaranteed circulation this issue, 27,000 copies, certified by U. S. Post Office receipts.

(Copyright 1929 by Don G. Gardner, Publisher)

ARMSTRONG Tool Holders are used in over 96% of the Machine Shops and Tool Rooms

They come with the finest machinery—ARMSTRONG Drop Forged Wrenches.

ARMSTRONG Drop Forged Wrenches are selected by many leading machinery manufacturers as standard equipment to go with their machines. They are chosen because they are strong, do not slip—for they are accurately milled. Because they do not spread—burr or round screw heads or nuts. Because they are balanced and easy to handle.



ARMSTRONG
Drop Forged Wrenches

36 Types

ARMSTRONG Wrenches are forged from special steel, are heat treated, have both stiffness and spring and will stand up under all manner of abuse.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

328 No. Francisco Ave. Chicago, U. S. A.

ARMSTRONG

TRADE MARK REG. IN U.S. PAT. OFFICE

"ARMSTRONG"

Tool Holders — Drop Forged Wrenches
Lathe Dogs — Ratchet Drills
"C" Clamps — High Speed Cutter Bits

Write today for Catalog B-27

"ARMSTRONG BROS."

Stocks and Dies — Pipe Cutters
Chain Pipe Tongs — Chain Vises
Pipe Wrenches — Hinged Vises

MODERN Machine Shop

DECEMBER, 1929

CINCINNATI, OHIO VOL. 2, NO. 7

Naval Maintenance Operations at the Boston Navy Yard

By HOWARD CAMPBELL

THE work of grooming our battle ships and other government vessels requires the services of ten navy yards, of which the Boston Navy Yard is one of the oldest. Here the U. S. S. Constitution—"the ship that was a navy"—was rebuilt in 1833, christening the same drydock in which she again is being reconstructed. The yard is under the command of Rear Admiral Philip Andrews, U. S. N., and the shops in which the work is carried on are under the direct supervision of Lieut. Commander W. D. Snyder, U. S. N.

Operations here consist of making repairs to scout cruisers, destroyers attached both to the Atlantic Fleet and the Coast Guard Service, ships that are attached to the Special Service Squadron and the "train." Small power boats for naval use are also

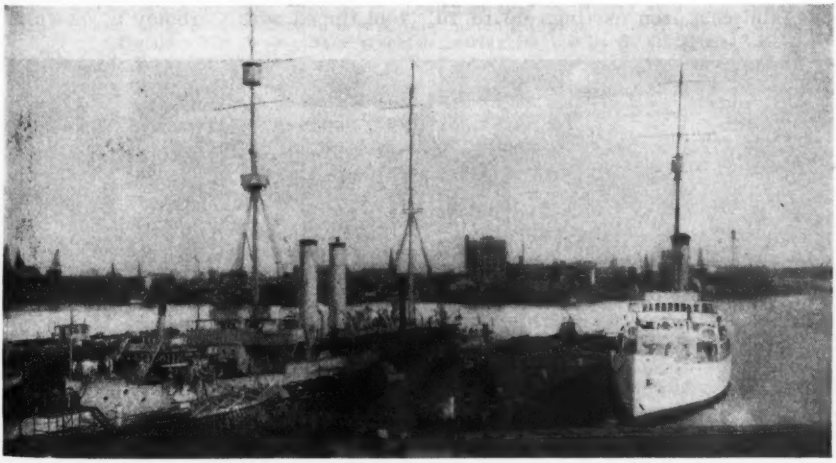
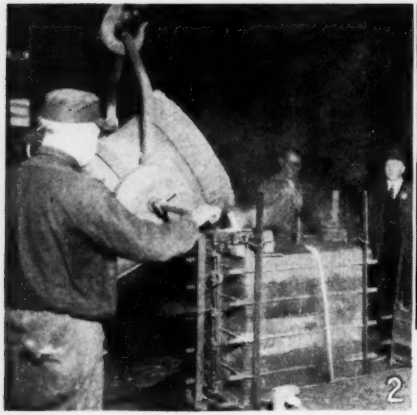


Fig. 1—One of the piers at the Boston Navy Yard.



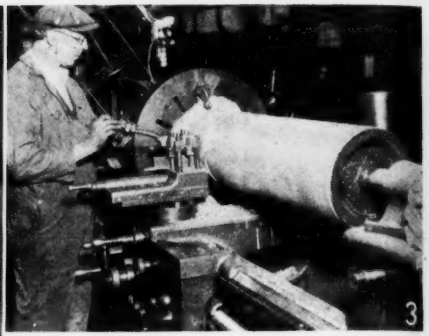


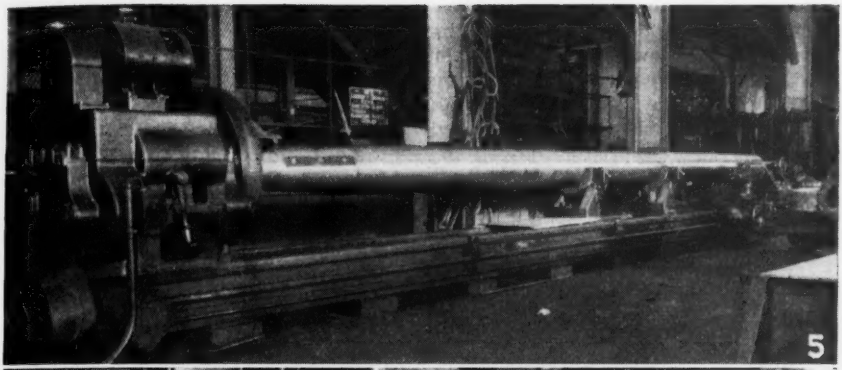
Fig. 2—Casting a turbine casing for the U. S. S. Sturtevant. Fig. 3—Using Carboloy to turn a Monel Metal pump liner for a D. stroyer.

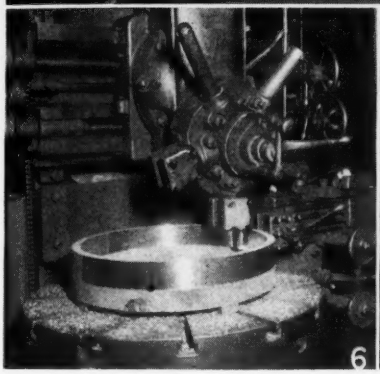
built here, and ships that formerly belonged to the Shipping Board, including the Leviathan, are overhauled periodically at this yard. Approximately 1,500 men are at present employed on ship repairs and nearly five hundred other employees are attached to the yard on other work.

The works include brass, iron, and steel foundries for the production of castings of various types and sizes, including bronze castings up to two tons, steel castings up to 4½ tons, and cast iron castings up to 20 tons. A casting operation is illustrated in Fig. 2, where the job of pouring a turbine casing for a turbine-driven main circulating pump for the U. S. S. Sturtevant is shown in process.

The officers in charge of mechanical operations keep fully abreast of new developments in the metal-working field, as is evidenced by the fact that the Navy Yard shops were among the first to adopt the use of the new tungsten carbide tools. A tool tipped with Carboloy is shown in

Fig. 4—Boring a bronze propellor shaft sleeve for the "Leviathan." A saving of 108 hours was made on three sleeves by the use of tungsten carbide tools. (*Photo courtesy "Carboloy."*)





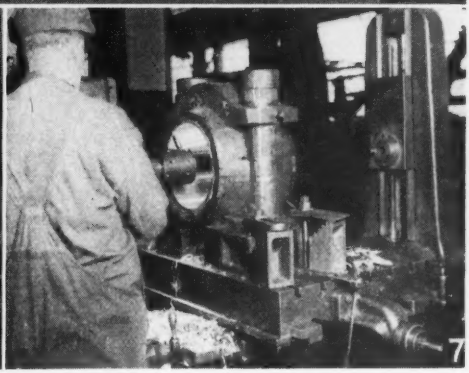


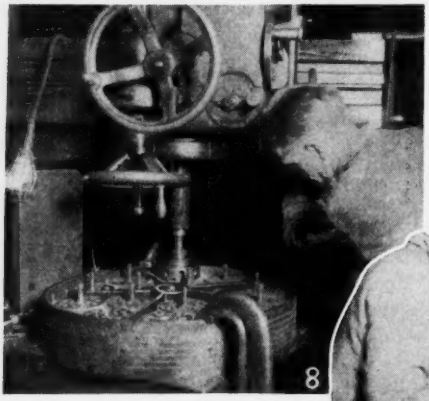
Fig. 5—One of the propellor shafts for the Leviathan after the sleeves have been shrunk on and turned. Fig. 6—Machining a bronze ring for an air pump plunger for the U. S. S. Oglala. Fig. 7—Boring a crankpin bearing for the U. S. S. Oglala.

use in Fig. 3, where the operation of turning a main feed pump liner for a destroyer can be seen in process. The liner is of Monel Metal, which is extremely tough and hard to machine; in fact, it is so hard that the previous method of machining was extremely expensive due to the necessity of frequent grinding of the high speed steel tools. The tool shown is taking a ¼-inch cut, feeding .040 in. per revolution, at a speed of approximately 24 ft. per minute. The speed is retarded by the fact that this is all the machine will pull.

In Fig. 4 is shown the operation of boring one of the bronze propellor shaft sleeves for the Leviathan. There are three sleeves used on each of the four shafts, each sleeve being about 12 feet long and finishing to a diameter of 19¾ in. inside. A limit of .001 in. is allowed for taper from end to end. Working to the close limits required has been a serious problem in the past, due to the fact that the tools required grinding several times in the course of a boring or turning operation. The use of tungsten carbide tools has made it possible to quadruple the cutting speed, and three sleeves are completed with one grinding of the tool. The saving in machining time alone

amounts to 108 hours for three sleeves.

One of the propellor shafts for the Leviathan is shown in Fig. 5, after the bronze sleeves have been put on and turned. The sleeves are shrunk in place, each sleeve being heated until it expands approximately ⅛ in., or until the metal begins to turn color. At this point the sleeve is slipped over the shaft, located in position, and three men equipped with air hose immediately begin to cool it, beginning at one end and working toward the other. Cooling the sleeve with air in this manner prevents it from shrinking endwise irregularly and thus precludes the possibility of loose spots due to imprisoned air between the sleeve and the shaft, at the same time minimizing the danger of cracking the sleeve. Every foot of each sleeve is inspected after it has cooled, and if a spot is found where the sleeve and shaft do not form perfect contact, the job must be done over. When cold, the sleeves are turned to 21.812 in., with a tolerance of ± .0015 inch.



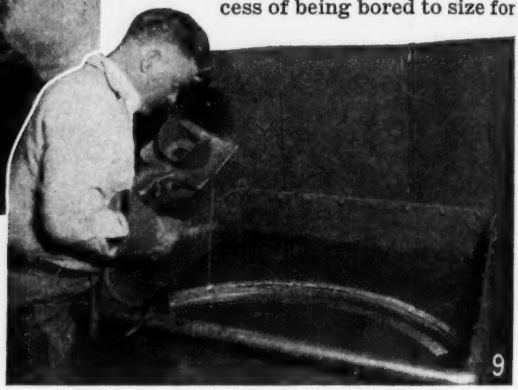


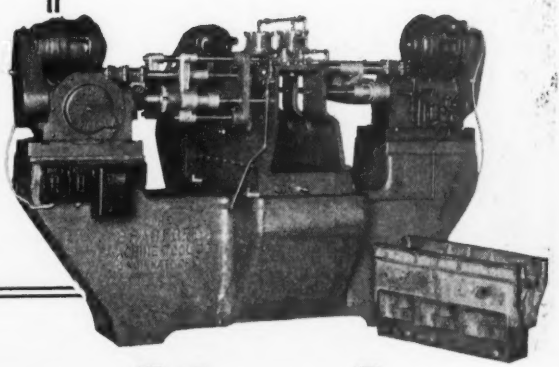
Fig. 8—Facing the valve seats in the "bucket" of an air pump for a torpedo boat destroyer. Fig. 9—Building up a nozzle plate for a high pressure turbine for the U. S. S. Mojave. Setting the piece in water prevents distortion.

The operation shown in process in Fig. 6 is that of boring, turning, and facing a bronze ring for an air pump plunger for the U. S. S. Oglala, the flagship of the mine-laying squadron. The machine is a vertical boring mill, and is one of a large battery of machines of this type, ranging from 24 inches to 26 feet in size. One of the crank-pin bearings for the U. S. S. Oglala is shown in Fig. 7, in process of being bored to size for the shaft. The bearing, which is of babbitt, is bored to 13.976 in., leaving .001 to .002 in. for scraping.

The mechanic shown in Fig. 8 is using a hollow mill to face off the valve seats in the "bucket" of a main air pump for a destroyer. The hollow mill makes it unnecessary to remove the studs from the piece, and at the same time produces an accurate, smooth finish on the valve seats. A radial drill press is used for this operation, as shown.

The value of the welding process—both gas and electric—is fully appreciated by the officers in charge of the navy yard work and much material

SPECIAL MACHINES FROM STANDARD UNITS!



Bradford

Drilling and Tapping Machines

consist of one or more Bradford standard unit type heads assembled into one unit and mounted at any angle. Industrial plants throughout the country have increased their production on an amazing range of special production work by the use of these tools.

As an example, an engine manufacturer is using the above machine consisting of three Bradford unit type heads for reaming seven water jacket holes simultaneously in three sides of a cylinder block. The total time for each block, including handling, is thirty seconds.

Investigate Bradford unit type heads—they will allow you to use standard equipment for special work *and get better results.*

Write for Bulletin

The Bradford Machine Tool Company
659 Evans Street **Cincinnati, Ohio**

PRECISION LATHE BUILDERS SINCE 1840

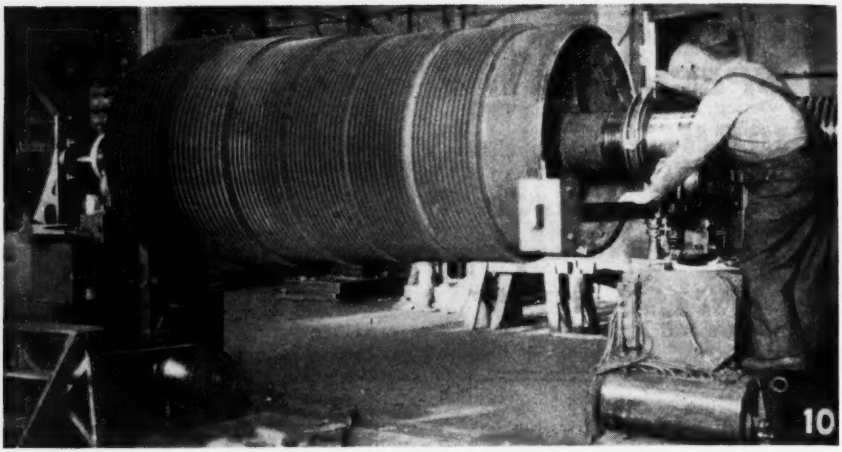


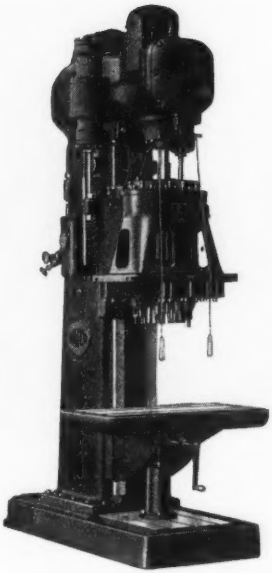
Fig. 10—Balancing a rotor for the turbine engine of a destroyer.

that would otherwise be scrapped is reclaimed by this process. Figure 9 shows a welding operator reclaiming a section of a high pressure turbine nozzle plate for the U. S. Coast Guard Cutter Mojave, using an electric welding outfit to accomplish the task. The clearance between the plate and the rotor blades is reduced by building up the surface of the plate with welding rod, the lower part of the piece first being immersed by laying the plate on a box which is just below the surface of the water in a tank, as shown, to prevent the possibility of distortion. This method of preventing distortion has been very successful.

Rotors for turbines are balanced both statically and dynamically with the balancing machine shown in Fig. 10. The mechanic is shown balancing a rotor for the turbine engine of the U. S. Coast Guard Destroyer Conyngham. The machine is too complicated to be described in detail here, but the exact information as to amounts and locations of un-balance is obtained by the use of adjustable weights and a scale. The points of un-balance are counterbalanced by the use of weights which are bolted and locked in place. The rotor is balanced at both ends before being released for service.

The Navy Yard engineers have recently developed a new type of chain link which has given evidence, under test, of being far superior to the cast steel link of common use. The new type of link is known as the "Dilok" link, and is made of drop forged steel. The usual type of 2½-in. cast steel chain is purchased subject to a proof load test of approximately 352,000 lb., the allowed minimum breaking load being 492,000 lb. The Dilok link of the same diameter has shown an average breaking load point of 905,000 lb. and is proof tested to 500,000 lb., which is above the allowed breaking load of the cast steel product. This great strength will make it possible to use a lighter chain, or to obtain added strength by the use of Dilok chain of the same size. Other claims for this chain are its uniform breaking load and resistance to wear,

(*Continued on page* 62)



NATCO

D 13 H HYDRAULIC DRILLER

NATCO HYDRAULIC MULTIPLE DRILLER

The above illustration shows a NATCO D 13 H Adjustable Multiple Spindle Driller. It is a medium sized machine equipped with a Hydraulic feed. In designing this machine NATCO Engineers have developed a driller that covers a large variety of work, is flexible in its application with simplified control and ease of operation.

The hydraulic feed is semi-automatic, the pressure being supplied by the NATCO Hydro Uni-power System. Pulling the starting handle starts the head traveling down feed, drills to correct depth, rapid reverses to the starting position and stops.

NATCO PRODUCTS

Standard Adj. Multiple Drills
Fixed Center Multiple Drills
Single Purpose Automatic Drills
Hi-Duty Single Spindle Drills
Drillers and Tappers
Special Machines

"NATCO Solves Your 'Hole' Problem"

THE NATIONAL AUTOMATIC TOOL CO.

RICHMOND, INDIANA, U. S. A.

Class of Apprentices in Session at Big Four Beech Grove Shops.

Apprentice Training Methods at the Beech Grove Shops

By AUGUST JACOB,
Apprentice Instructor, C. C. C. & St. L. R. R.

THE Big Four Shops at Beech Grove, Indiana, being unusually large and well-equipped, afford first-class facilities for the training of boys and young men who desire to enter one of the trades upon which the maintenance of railway rolling stock depends. Accordingly, a systematic method of training apprentices has been developed which has thus far proved very satisfactory. The school is conducted by an instructor who not only directs the activities of the apprentices in this school, but who also keeps a record of all apprentices at other points on the system. He is assisted by a senior apprentice who is chosen by him and who serves from three to six months in this capacity.

The trades taught include the machinist, boilermaker, blacksmith, electrician, patternmaker, car-builder, pipe-fitter, and tin and coppersmith trades, each apprentice following a prescribed course of study, his progress being limited only by his own ability and effort. The school year consists of eleven months, the school being closed during the month of August to allow for renovating and repairs. Each apprentice attends class two hours a day, two days a week, from 8 a. m. to 10 a. m. The balance of his time being spent working at his chosen trade in the shops, repairing cars or locomotives, under the supervision of the foreman and under the direction of a shop instructor. The apprentice is paid for his school attendance at his hourly rate.

The candidate for appointment as an apprentice must pass an examina-

What duplicate hand adjustment means

The new No. 3 Cincinnati Miller gives you still another new convenience! For the *first* time on a knee and column type machine you have independent hand adjusting cranks with large easily read micrometer setting dials both at the front and *rear*. Your operator can now accurately make any cross movement of the saddle or vertical movement of the knee that he needs for positioning the cutter—from the front or rear of the table without moving from his *normal* operating position. He has complete control—with his work and cutters in full view. Think what this exclusive feature means—your operator's time and energy saved—work spoilage reduced—production increased. All mean greater profits for you.

Toolroom and manufacturing shops alike, demand milling machines with a new accuracy and a new convenience. Where else but on the new No. 3 Cincinnati Millers can you find this combination of accuracy and convenience?

The Cincinnati Milling Machine Co.

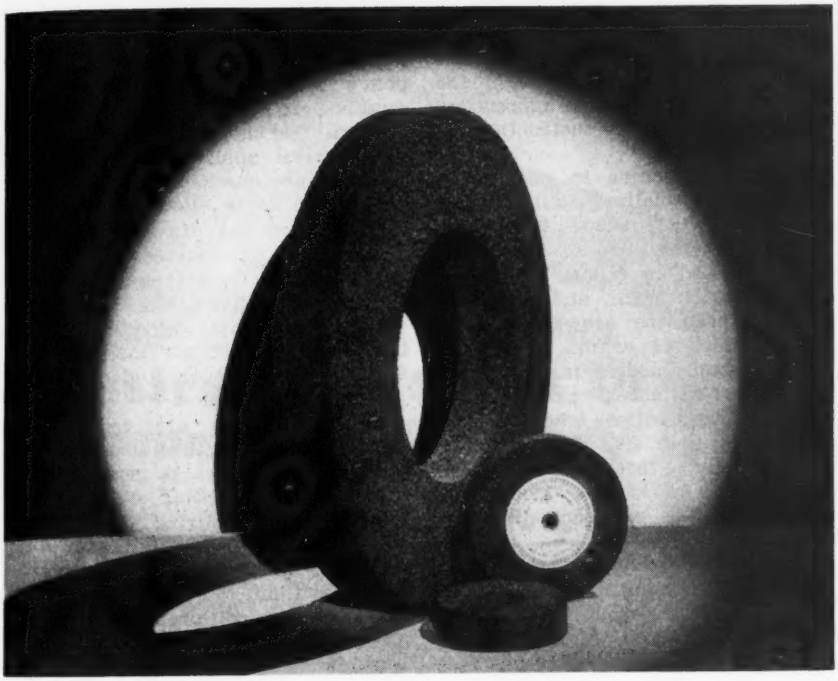
CINCINNATI, OHIO, U. S. A.

tion consisting of ten examples in mathematics and twenty words to be spelled, and he must also write a letter of application to the superintendent of the shops, requesting appointment to learn his chosen trade, the letter to contain not less than twenty words. Each new apprentice is loaned a drawing board, T-square, and other equipment which he returns when he has completed his apprenticeship. He is required to purchase his own drawing instruments.

In the first lesson the apprentice is required to familiarize himself with the standard sizes of drawings and tracings as used on New York Central Lines, the standard style and sizes of lettering, and the different views required in making a drawing. He is then given his first lesson in drawing, the subject being a small rectangular block of wood and the task involving the drawing of a plan view, and end and side elevations. He is also taught how to locate the views properly on the sheet. An instruction sheet is provided with each lesson for guidance. This method of teaching drawing is followed throughout the entire course, each subject being more difficult than the previous one, and with one or more views left off the instruction sheet for the student to work out alone. The instruction is continued along these lines until the apprentice comes to his twenty-fourth lesson, at which point he is given a sketch-book and two-foot rule and is instructed to make a free-hand drawing of each subject that is to be drawn henceforth. After the free-hand drawing has been checked by the instructor, he is given permission to draw the subject on a standard drawing sheet. Each lesson is handled in this same manner up to Lesson No. 40, which is the first lesson in drawing threads. At this point he is taught how to draw all the various kinds of threads and is taught the uses and advantages, if any, of each. A number of lessons on the drawing of threaded parts follow at this time.

Upon reaching Lesson No. 52, the apprentice is given the task of tracing his drawing upon a sheet of tracing paper, which must be done in a satisfactory manner before he is al-

East End of Classroom, Showing Some of the Working Models.



For High Speed Snagging—

Portable Grinders, Swing Frame Machines or Floor Stands

FOR all types of high speed snagging equipment there are Norton Bakelite bonded wheels with their open structure for cool, fast cutting—wheels that will give maximum production at minimum cost. Norton Bakelite wheels were developed by the Norton research laboratories with their staff of highly trained engineers and are produced in the Norton plant with its modern equipment.

NORTON
GRINDING WHEELS

NORTON COMPANY
Worcester, Mass.

W-275

lowed to proceed further. He then traces in ink all subsequent drawings up to and including Lesson No. 63, which is the final lesson of the first course. Thus far all apprentices have had the same instruction in drawing.

The second course in mechanical drawing is specialized so that each apprentice will receive instruction pertaining to the line of work that he has elected to follow. The machinist, blacksmith and patternmaker apprentices are required to draw locomotives or machine parts, working from models in the classroom or from actual parts in the shop. The apprentices who are most proficient in their drawing and school work are given three months of actual experience in the Mechanical Engineer's office on locomotive and car drawing.

The second drawing course for boilermaker, tinsmith and coppersmith apprentices consists of instruction in the drawing of sheet metal parts. The student begins with the development of patterns of simple design, the subject for each succeeding lesson being increasingly difficult. The boilermaker course takes the student through the development of all locomotive boiler parts, while the tinsmith and coppersmith course includes the development of all kinds and styles of railway hardware such as oil cans, water and coal buckets, scoops, and so on. These drawing courses, together with the necessary instruction in mathematics, usually continue throughout the entire four-year course of apprenticeship. During the last six months of his training, the student is required to develop his patterns from regular working drawings furnished by the mechanical engineer's office, the drawings being the same as are issued to the shop for standard work.

The second course work for the electrician consists of making drawings of switchboard work and wiring diagrams, and as soon as the student's work indicates that he is qualified to proceed further, he is sent to the shop to make sketches of electrical appliances in use. His sketches are checked by the instructor before he is allowed to proceed with making the drawings.

The drawing courses as outlined are all that the average apprentice is expected to finish, but if a student shows exceptional ability and application, the instructor makes it his duty to see that such student obtains additional instruction.

All apprentices are required to take the mathematical instruction, a large part of which is general. The student is required to do a certain amount of his studying at home and it is compulsory that he hand in at least one home lesson, consisting of not less than four sheets of problems, on the 25th of each month. The first course consists of 199 lessons in every-day shop arithmetic, and includes fractions, percentage, mensuration, time and speed, horsepower, and so on. The amount of instruction required along this line depends upon the amount of previous education the appentice has had, and is left to the discretion of the instructor. The second course deals with the more complicated problems connected with shop work, such as horsepower developed by machines or locomotives, the erection of shafting for machine work, and cutting speeds and feeds for all machines. The machinist apprentice is required to finish an additional course in mathematics dealing with the tools and machines with which he will work.

The first school room course in mathematics and mechanics covers the principles of mechanics, includ-

(Continued on page 57)

For Those Who Desire the Utmost in Accuracy and Long Life

this Goodell-Pratt micrometer caliper is made. These qualities are insured by the extreme care taken in its manufacture, the highest grade of materials used in its construction, and its scientific design. Only men with years and years of experience are entrusted with its tempering, fitting, assembly, and inspection—men who are themselves lovers of fine tools.

It is the PERFECT micrometer—one that will be handed down (if given the proper care) from generation to generation.

Of special interest in the micrometer illustrated is the Eccentric Locking Device, Ratchet Stop, and Speeder—features that insure accurate and speedy work.

This is just one of a complete line of micrometer calipers—if your dealer does not carry them, just write to the toolsmiths—

Send for a copy of our Tool Handbook, it's free

GOODELL-PRATT COMPANY

GREENFIELD, MASS., U. S. A.

Chicago Office	New York Office	London Office
38 N. Clinton Street	107 Lafayette St.	127 Queen Victoria St.

GOODELL-PRATT

1500 GOOD TOOLS

Aircraft Welding, Including Development of an Efficient Welding Department

By Russell F. Hardy,
Chief Engineer, The Waco Aircraft Company

Russell F. Hardy

WHEN one considers that approximately 20 per cent of the personnel engaged in the construction of the conventional airplane of today are welders, he at once realizes the importance of the welding department. Many of the major structural units of the airplane, such as the landing gear, fuselage, and empennage, receive their strength through the fabrication of steel tubing by welding. Consequently, it should be the desire of every airplane manufacturer to develop the welding department to its highest efficiency.

In order to accomplish this, there are several factors which greatly assist, and which must be given considerable attention. They are primarily as follows:

(1) Personnel; (2) Favorable working conditions; (3) Efficient equipment; (4) First class material. These items will be considered in the order given.

The difficulty of securing good welders is not as great as it was several years ago when "The Waco Aircraft Company" was organized. At the present time, there are many aircraft companies employing from a few to scores of welders and, as in most professions, they migrate to the companies which have the most favorable working conditions and which pay the most attractive prices.

If, however, experienced aircraft welders cannot be obtained at any particular time when needed, the foreman in charge may conduct a school after working hours. These classes are always well attended by outsiders, partly because welders are paid slightly higher wages than most other workmen. These classes continue until the foreman can foresee and choose those students who are most capable and most consistent in their work. They are then put to work tacking or welding parts which take little or no structural stress. This work is carefully supervised until they have at least mastered the fundamental principles. Later, after having become proficient, they are given more important parts upon which to work.

It has been found that in most cases it is more practical to train inexperienced men than to "untrain" men who have been accustomed to welding heavy material. In the latter case, the problem has been to get sufficient heat to make a good weld, while in the case of most aircraft welding, care must be taken not to overheat or burn the metal. * * *

Just as a skilled workman under

(*Read at Thirtieth Convention of Acetylene Assn., Chicago, Nov. 14th*)

FOSDICK

21-inch Heavy Duty Upright Drill

for all standard drilling jobs

All-geared drive.

Ground column.

Column braced. Brace encloses drive shaft.

Spindle is high carbon hammered steel forging.

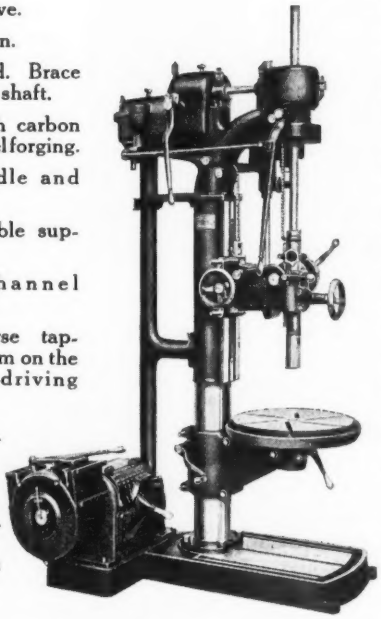
Ground spindle and sleeve.

Extra rigid table support.

Lubricant channel around table.

Friction reverse tapping mechanism on the high speed driving shaft.

Speed box convenient, containing steel gears giving 12 spindle speeds. Five feeds to each revolution of spindle.



Hardened steel bevel gearing to transmit power.

Ball bearing bevel gear thrusts.

Start, stop and reverse friction lever conveniently located.

Worm feed. Worm runs in oil bath.

Duplex feed and quick return.

Power feeds controlled by single lever—can be shifted while drilling.

Automatic trip and depth gauge.

Capacity—2½-inch H. S. drill in steel or 3-inch pipe tap in cast iron.

This machine has been especially designed to meet the demand for a high-grade, rigid, accurate, powerful drill for all kinds of standard drilling and tapping jobs. All-geared drive for drilling, and the most powerful friction reverse tapping mechanism known for tapping.

BUILT IN THREE SIZES—21", 25" and 30".

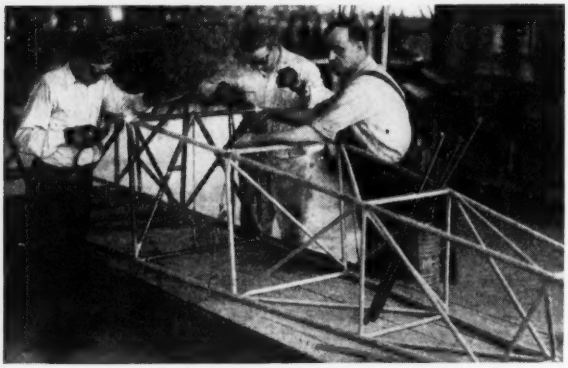
Ask For Specifications

THE FOSDICK MACHINE TOOL CO.

CINCINNATI, OHIO, U. S. A.

favorable working conditions is handicapped unless he has proper tools, so is the welding department handicapped if it is compelled to use poor equipment.

The equipment might be considered as originating with the sources of acetylene and oxygen supply. These sources play a very important part in the efficiency of any welding department and it might be well to include a few of the major points to be considered in the installation and operation of these units.



Joining Front and Rear Sections of Fuselage

The generator building should be separate from the main building to reduce fire and explosion hazards to a minimum. The building should be of fireproof construction and should be well ventilated. Artificial heat, necessary to prevent freezing in the generator, should be supplied by steam, hot water, or other indirect heating systems. The heater should be so located that no flame is near the generator enclosure. The generator building should not be open to unauthorized persons but should be cared for by one who is very competent in order that proper operation of the generator will be assured.

The generator must be flushed out with water before each new charge is made. Overheating of the generator, caused by working it beyond its rated limit, will usually cause variations in the quality of the gas. Acetylene gas should be as free as possible from chemical impurities. Filters in the line aid in preventing such impurities as lime dust from entering the weld. The quality of the acetylene gas depends primarily on the carbide used and the care which is given to the generator.

The oxygen unit used by this company consists of a battery of twenty bottles, each of which is connected to a manifold which supplies oxygen to various points in the department. Ten of the bottles are in operation at a time and will supply sixty operators for approximately six hours. Oxygen, purchased in bottles, is usually very pure and uniform as to quality. Since oxygen supports the combustion, the temperature of the welding flame is greatly affected by its chemical purity. It is claimed that the purity of oxygen is usually in the neighborhood of 97-98 per cent. If the purity is less than this percentage, the result is an increase in consumption with a decrease in temperature. Nitrogen, being the principal impurity in oxygen, acts as a useless heat consumer and can produce harmful results if it gets into the weld.

There is no one unit which so greatly influences the quality of a weld as the oxygen or acetylene regulator. The duty of the regulator is to reduce the pressure and maintain the

WINNING THEIR WAY
with the "Show Me" buyers

LARGEST electrical manufacturing companies starting with test orders in 1926, now buy in quantities, with 1929 showing 600 per cent increase over 1928. From the largest plants down to the smallest come orders for

APEX
FRICTION CHUCKS
SAVE TIME AND TAPS

ONE FIRM broke nine taps a day on a difficult job, but hasn't experienced a single one in four months since adopting the Apex friction. Another increased production 65 per cent on tapping. Still another went ten months without breaking a tap. Hundreds of others report similar success.

The Apex friction is best appreciated when tapping alloy steels, blind holes and working in toughest of metals. When Apex free-floating tap collets are used the taps follow the holes, tap them better, do it faster. This chuck also used on many other operations.

Great for use with electric tools for stud and nut setting. They slip without jar or strain when predetermined tension is reached. Prevent stalling and burning out of motor.

Take your tip from others. Get one for try-out. Find out for yourself why you can wear out taps instead of breaking them and do faster work. If not satisfactory fire it back.

ALSO BUILDERS OF

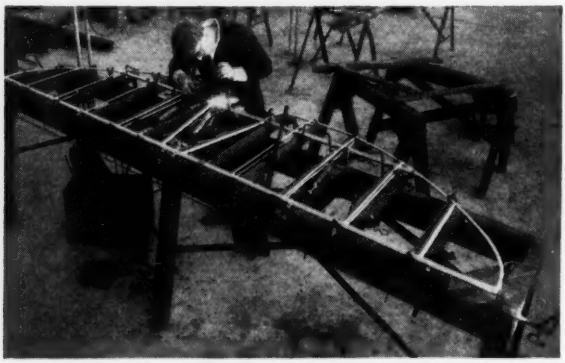
Floating Tool Holders
Multiple Spindle Tapping Chucks
Universal Joints
Universal Joint Nut Setters
Stud Setters
Quick-change Drill Chucks
Floating Tap Sleeves

YOU'LL find any of these tools different and better. Send for any one you want to try. We guarantee them.

The Apex Machine Co.

305 DAVIS AVENUE DAYTON, OHIO

desired reduced pressure without fluctuation so that a neutral flame in the torch is maintained. The regulators are the lungs of the welding equipment and unless the regulator is properly seated, and the diaphram is functioning perfectly, it is impossible for the operator to keep a neutral flame, no matter how skillful he or she may be. Great care should be taken before opening either oxygen or acetylene tanks, to see that the thumb screw of these regulators is screwed almost entirely out to the last thread. This will insure against broken seats or distorted diaphrams. Only high grade mechanics should attempt or be allowed to repair regulators.



Fabrication of Horizontal Stabilizer in Steel Jig

As a general rule, it has been found that the smallest size tip, or welding head, which will properly do the work, should be used. This will tend to localize the heat and consequently will reduce the amount of distortion. It is very wrong to assume that in every instance a larger tip and higher gas pressures will increase the speed of welding the same proportions, for, in many cases, it will slow up the welding and increase the difficulty of making a satisfactory joint as well as increase costs. The correct size of welding head is another matter which demands some investigation. It is unsatisfactory to allow each operator to use his own ideas. * * *

Welding operations in airplane production are greatly facilitated by jigs and fixtures. Operations that would not otherwise be possible are efficiently accomplished by the use of these mechanical devices.

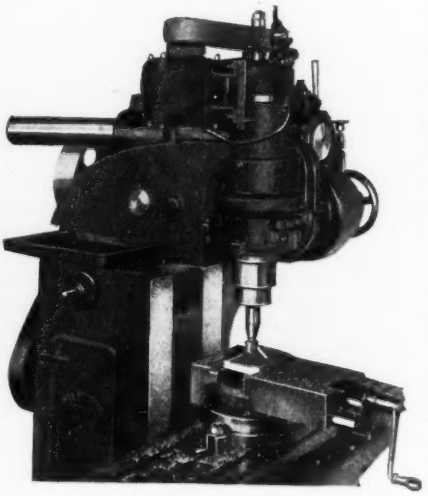
Another primary advantage to be obtained through the use of jigs is the accuracy of dimensions in the finished product. This is a most important feature when parts which are being fabricated are later to be assembled into a larger unit. Jigs should be so designed that members cannot be improperly placed in them and thus rejection can be reduced to a minimum.

Jigs and fixtures partially control and direct the expansion and contraction which is expected and allowed for in the welding of light gauge material. They should be built up of heavy material so that they may not easily become distorted. Test jigs are also very desirable in that when a fabricated unit, such as landing gear Vee, is completed, it may be checked for alignment and accuracy of dimensions in the test jig. This will prevent many rejections on the final assembly after much work has been put on the product. Jigs for holding large parts can in some cases be mounted on trunnions so that the unit may be rotated when the welding is completed on the one side. This makes it much easier for the welder

VAN NORMAN

High Speed Milling Attachment

IN INTRODUCING the Van Norman High Speed Milling Attachment, we wish particularly to recommend it—in conjunction with Van Norman Duplex Milling Machines—to makers of metal patterns, models, die-castings or glass moulding dies. On work of this class, and, in fact, wherever it is desirable to run end milling cutters of widely varying diameters on the same machine and at approximately correct peripheral speeds, or to combine light and heavy cuts during one set-up of the work, this attachment will be found ideal for cutters of $\frac{3}{8}''$ or less diameter. An application of the attachment is shown by the illustration.



Write for Bulletin No. 100

Van Norman Machine Tool Co.

150-200 Wilbraham Avenue

SPRINGFIELD MASSACHUSETTS

to produce a good weld on all sides.

After a unit has been welded, it is necessary that it be thoroughly sand blasted before proper inspection can be carried out. The sand blast room should be located adjacent to the welding department when possible, as it may then be easily supervised by the welding department foreman. The products should be inspected immediately after sand blast and from this department should go directly to the paint room for protective coatings before corrosion begins.

It has been found in many cases that the quality of a weld is highly dependent upon the welding wire used. The quality of the welding wire is consequently dependent upon its chemical composition and the manner in which it is produced and preserved. Low carbon wire seems to find greatest favor among welders for welding 1025 steel and in many cases for Chrome-Molybdenum steel. A wire of .06 per cent maximum carbon content has been found to be very satisfactory for welding 1025 S. A. E. steel. An experienced welder can best tell by actual welding tests which wire is most suitable for a given grade of steel. The wire should be stored in a dry place and be kept free from oil and rust.

The majority of the steel used in aircraft construction is reasonably uniform as to chemical and physical properties. Chrome-Molybdenum and 1025 S. A. E. steels are the most common at the present time. Failures in a welded joint are very seldom caused by the steel itself but can usually be traced to poor design or the use of improper welding methods.

Preventing Decarbonization In An Electric Furnace

By R. H. KASPER

MANY users of electric furnaces for the heat treatment of steel are of the opinion that electric heat is absolutely non-oxidizing. In a sense this opinion is correct, but under certain conditions the electric furnace may be capable of decarbonizing the steel to a considerable depth. The average user of a gas furnace is usually careful to adjust the mixture to produce a non-oxidizing flame; with the electric furnace, due to absence of flame, any precaution whatsoever is considered unnecessary.

The writer has had no experience with electric furnaces, but an incident cited by a metallurgist connected with a prominent steel mill may be worth repeating.

A call was received from a manufacturer stating that a recent shipment of steel failed to harden. A visit to the mill showed that an electric furnace with all modern equipment, including a recording pyrometer and automatic control, had recently been installed, so the question of inefficient equipment was dismissed without further thought. Investigation proved that the steel did harden, but was decarbonized to a considerable depth. The fault was traced to a small opening around the cover of the furnace through which air was drawn as the oxygen in the air in the furnace combined with the carbon in the steel, so that the condition was actually more severe than in a gas furnace, due to the absence of fuel. The remedy was simple; a can of charcoal placed in the bottom of the furnace kept the air in the furnace in a non-oxidizing condition.

(Editor's Note: The problem of decarbonization is encountered frequently, in all types of furnaces. The remedy suggested may eliminate the difficulty in some cases, but it should not be considered as infallible.)

THE NEW 262

SELF OILING ALL GEARED

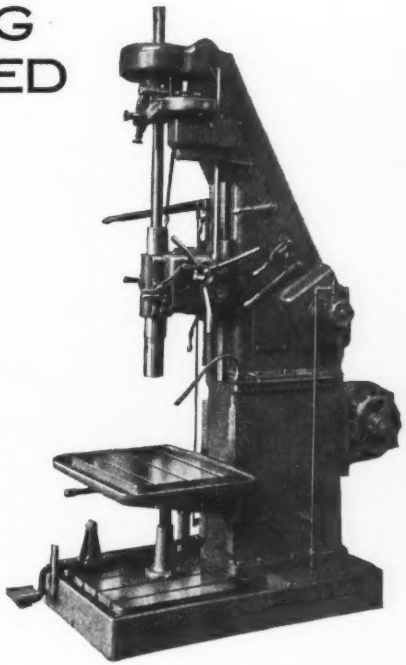
DRILL

Beginning with the base and column, the design of this Self-Oiling All-Geared Drill is new throughout. It is as modern as tomorrow.

Wide range of utility is provided. The sliding head has 19½" of adjustment on the column with a maximum distance from spindle to base of 50". Standard spindle travel for any position of head is 15½".

This machine has the power, speed, strength and rigidity for driving high-speed twist drills 2½" diameter to capacity—and it has a generous factor of safety. It bores an 8" hole in cast iron and is ideal for cylinder boring, deep-hole work, heavy drilling and accurate tool room service.

A few important features of construction in this new No. 262 Self-Oiling All-Geared Drill are—Box-section column and head giving maximum strength and rigidity; Gunite cap for take-up on the spindle-bearing; eight feeds and eight speeds, all quick-change, all controlled from the operator's working position and all clearly indicated for each position of the control levers. Additional features, equipment and specifications are clearly described in bulletin 262 which is part of our complete catalog—send for it today.



Write for Catalog U

BARNES DRILL CO.

801-851 CHESTNUT STREET ROCKFORD, ILL., U.S.A.

This Wisconsin Tool Shop Has a Side Line

By PHILIP WINTER

THE salesman who handles a side line is not unusual, but here is a tool and die manufacturing company which has developed a side line to keep itself busy when the regular line of work strikes a dull season. This firm is the Follen-Strom Manufacturing Company, of Kenosha, Wisconsin. As the tool and die business is largely dependent upon conditions in other lines, such as the automobile business, a business depression that affects any of the tool shop's customers is also felt in the tool shop. The result is that, unless the tool shop is blessed with a manager of unusual ability, it is, practically speaking, rushed one day and slack the next.

Mr. Jas. H. Follen, President of the Follen-Strom Company, has succeeded in eliminating this uncertainty, to a large extent, and has insured reasonably steady employment for his organization by the development of a line of perforating machines upon which the men can keep busy when tool work is not plentiful. A stamping department also forms a part of the plant, and stamping work is solicited upon a contract basis. The stamping department is not only an independent, going concern in itself, but it also serves to provide work for the die shop.

The perforating machines made by the Follen-Strom Company are used by the Government Post Office Department for cancelling money orders, by banks for cancelling checks, and by other institutions for cancelling can labels, cigar labels, and so on. Most of the customers, including the government, purchase perforating machines at regular intervals, which makes it possible for the Follen-Strom Company to anticipate with reasonable accuracy the number of machines that will be ordered, and thus keep a number of machines in production. Then when orders for

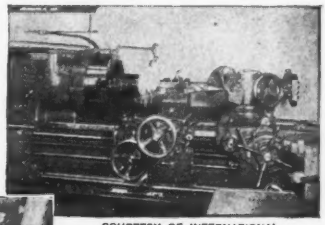
Used SUNOCO Machine Tool Exhibit

USERS find Sunoco's first cost; its long lasting, non-separating qualities; and its performance as a refrigerant and lubricant most convincing.

As far as we know the following advantages are possessed only by Sunoco:—

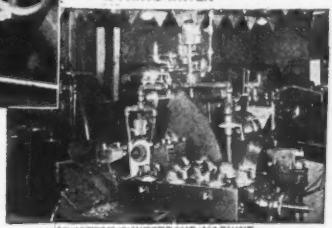
Increased cutting speed.
Increased quantity of metal removed per tool grind.
The greater quantity of water which can be added for a given kind of work.
The time the mixture can be used before replenishing.
Prevents rust and has unusual cooling properties.
Protects operators from skin infections.

The nearest of the offices listed below awaits your correspondence

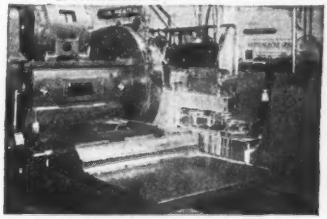


COURTESY OF INTERNATIONAL MACHINE TOOL CO.
OPERATION: TURNING AND DRILLING CROSS HEAD PIN
MACHINE: 3-H LIBBY-LATHE
MATERIAL: .45 CARBON STEEL
STOCK REMOVED: 2"
FEED: ¼"
SPEED: 125 S.F.M.
TIME PER PIECE: 11 MIN.
LUBRICANT: 1 PART SUNOCO TO 40 PARTS WATER

COURTESY CINCINNATI GRINDERS, INC.
OPERATION: GRINDING PISTON PIN
MACHINE: NO. 2 CINCINNATI CENTERLESS GRINDER
MATERIAL: HARDENED STEEL
LIMITS: ROUND WITHIN .00005" STRAIGHT WITHIN .00005", SIZE WITHIN .0001"
STOCK REMOVED: .001"
PRODUCTION: 28 PER MIN.—THRU FEED
LUBRICANT: 1 PART SUNOCO TO 40 PARTS WATER



COURTESY SUNDSTRAND MACHINE TOOL CO.
OPERATION: TURNING AND FACING FLANGE YOKE
MACHINE: 12" SUNDSTRAND STUB LATHE EQUIPPED WITH 2 SPEED MOTOR
MATERIAL: .1630 CARBON
STOCK REMOVED: 1/16"—1/8"
FEED: .019"
SPEED: 90 & 137 R.P.M.
PRODUCTION PER HOUR: 50 PIECES
LUBRICANT: 1 PART SUNOCO TO 20 PARTS WATER



COURTESY COVEL-HANCHETT CO.
OPERATION: GRINDING LOCOMOTIVE GUIDE BAR
MACHINE: NO. 630 UNIVERSAL GRINDER, REVOLVING FIXTURE
MATERIAL: SOFT STEEL FORGING
STOCK REMOVED: 1/16"—1/8"
WHEEL: 44" DIA. SEGMENTAL WHEEL
TIME PER PIECE: 14 MIN.
LUBRICANT: 1 PART SUNOCO TO 40 PARTS WATER

SUN OIL COMPANY, Ltd., Montreal

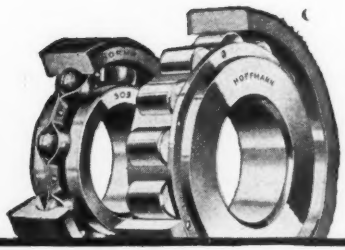
OCO
CUTTING OIL
of BLUE SUNOCO MOTOR FUEL

JACKSON, MICH.
JACKSONVILLE
MIAMI
MONTREAL
NEWARK
NEW YORK
PHILADELPHIA
PITTSBURGH
PROVIDENCE
READING
ROCHESTER
SYRACUSE
TAMPA
TOLEDO
TORONTO
TRENTON
TULSA
WILMINGTON

Fig. 2—View of Machine Shop in Follen-Strom Plant. Fig. 3—The Lathe Department Occupies One Side of the Room. Fig. 4—The Heat Treat Department Contains Three Hardening Furnaces and a Cyanide Bath.

tool and die work drop off, the mechanics can be kept busy building perforating machines. This method of operation has worked out very successfully so far, and has made it possible for the firm to maintain an organization of picked men, whereas otherwise it would be necessary to lay off a part of the force at intervals and then trust to luck to be able to hire capable artisans when business "picked up" again.

The plant is now in its third location, having grown from a four-man organization occupying one small room to a 38-man organization which is housed in its own quarters—the building shown at the head of this article. The major part of the machine shop is shown in Fig. 2, and the remainder is illustrated in Fig. 3. A view of the heat treating equipment, Fig. 4, shows the large furnace which is used for case hardening and carbonizing puposes, a smaller furnace in which smaller work is hardened or tempered, a still smaller furnace which is also used for harden-



PRECISION

... its meaning and its commercial value ...

PRECISION, as commonly used, is a term defining extreme refinement of dimension and finish. But as describing an outstanding quality of *NORMA-HOFFMANN Precision Bearings*, the word has a far more comprehensive meaning.

To Norma-Hoffmann engineers and production men, *Precision* means the ultimate in dimensional refinement. Above and beyond this, however, it means bearing design worthy of expression in a finished product of this extreme refinement—selected materials well deserving of special treatments and of highly refined machining processes—standards of production which permit no deviation from absolute uniformity, regardless of quantity.

Precision, as thus described, is the foundation quality upon which the Norma-Hoffmann reputation rests, upon which its business has been built, and upon which it must continue to grow.

But what does all this mean to the buyer and user of *NORMA-HOFFMANN Precision Ball and Roller Bearings?* What, in other words, is the commercial value of *Precision?*

Briefly stated, *Precision* stands for that combination of qualities which manifests itself in higher anti-friction efficiency, longer life, greater speedability, better performance, lower costs for replacements, increased production. These are the distinct and concrete advantages which accrue to the user of *NORMA-HOFFMANN Precision Bearings.*

Obviously, *Precision* is costly to produce and to maintain. But it has been the uniform experience of those who have availed themselves of its advantages, that its price is repaid a hundred fold in the lower after-costs which inevitably follow.

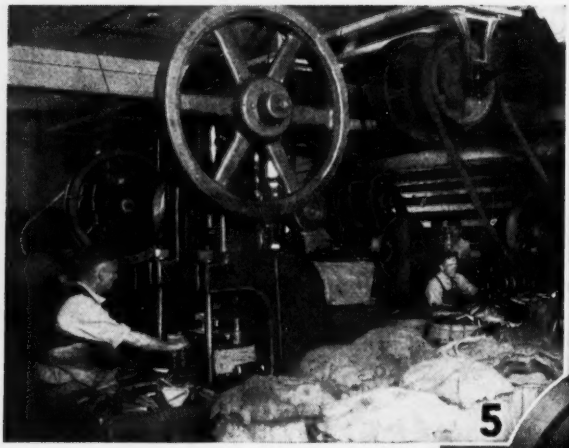
The long, varied experience of Norma-Hoffmann engineers is offered without obligation to machine users and builders facing bearing problems.

NORMA-HOFFMANN

PRECISION BEARINGS

NORMA-HOFFMANN BEARINGS CORPN.—STAMFORD CONN. U.S.A.

JIM K28 JIM K29



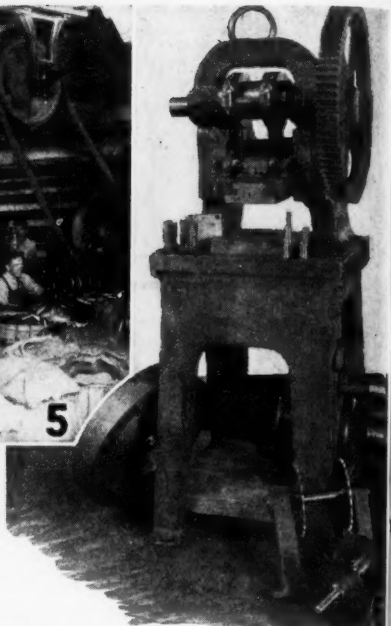


Fig. 5—View in Stamping Department. Fig. 6—A currency cancelling machine under construction. This machine will be used by the Treasury Department for cancelling the new-size currency.

ing — usually tools — and a cyanide bath for cyanide hardening. The stamping department is shown in Fig. 5. Fig. 6 illustrates an interesting type of perforating machine in process of construction. This machine is a "currency canceller" and will be used at the Treasury Department in Washington for cancelling the new-size currency.

The Follen-Strom Company is one firm that is building for success by making two jobs grow where only one job grew before.

Conway Clutch Moves

The Conway Clutch Company, formerly of 1959 West Sixth Street, Cincinnati, Ohio, has moved its plant to 1543 Queen City Avenue, Cincinnati, where larger quarters will enable this company to catch up with orders for Conway Multiple Disc Clutches.

Eclipse Counterbore Expands

The Eclipse Counterbore Company has moved into its new building at 7410 St. Aubin Avenue, Detroit, Michigan, where it will have the advantage of increased space and better manufacturing facilities. The working organization has been practically doubled and the progressive system of manufacturing has been installed. A stock of finished counterboring tools valued at from $150,000 to $200,000 is now constantly carried on hand for the immediate requirements of customers.

Strength Without Weight

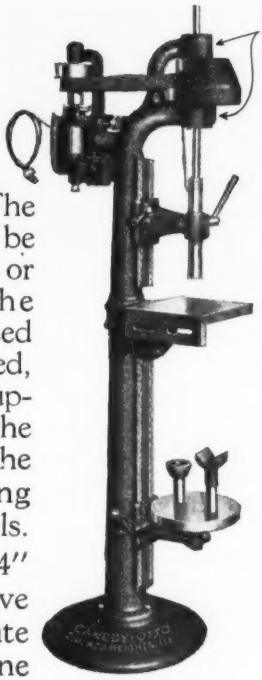
Co-operation of the United States Bureau of Standards with the designers and manufacturers of aircraft has resulted in the development of structural girders, built up of duralumin strips, which are so light that a 16-foot length can be held by the little finger, and are so strong that this same length will support 16 men without collapse.

CANEDY-OTTO

14" Sliding Head Sensitive

FLOOR DRILL

As typical of the convenience offered in C-O Drills, note the two tables included as standard equipment of this floor drill. The square table may be tilted to any angle or swung around the column and replaced by the round, cupped, or V block table supplied. "Ready for the job" delivery is the first cost-reducing feature of these drills. The Canedy-Otto 14" Sliding Head Sensitive Drill is a fast, accurate production machine for holes from 0 to ½". It can be furnished



CATALOG UPON REQUEST

either as a single spindle machine, or with multiple spindles, in the bench or floor type. Cone pulley runs in Timken Roller Bearings and spindle runs in ball thrust bearing, supported by sleeve with extra long bearing.

Verticle motor attachment simplifies power transmission, eliminates idlers, pulleys, twist and turn belt, etc., reducing power required for efficient operation. The spindle speeds are 400, 850, and 1,750 r.p.m. This drill can also be furnished in combination speeds as follows: 525, 1,400, 3,000 r.p.m.; 1,000, 2,200, 5,000 r.p.m. and 3,400, 5,600, 10,000 r.p.m.

CANEDY-OTTO

CHICAGO HEIGHTS, ILL.

New York Branch:
407 Broome St.
New York City

Complete Stock At All Branches

San Francisco Branch:
955 Folsom St.
San Francisco, Cal.

Taking Inventory

By J. J. BERLINER, B. C. S.,
Senior Member of The National Accounting Systems

THE physical inventory taken at least once a year may be said to be the cornerstone of every accounting system. It is one of the most vital parts of business organization. Yet, in many plants, the taking of inventory is anticipated with dread. In such plants, inventories are taken hastily and without system, a large part of the routine work being carried out without any definite or prearranged plan. Consequently it often happens that much of the inventory has to be taken again, which prolongs the period and increases expenses.

The correct method of taking inventory is the "duplicate tag method." Under this method, detailed preparations are made long before the date set for starting the inventory. Each employee who is to participate in the work is assigned a definite task and is informed as to whom he should consult in case he should need advice. The progressive steps under the "duplicate tag method" are as follows:

1. Issuance of inventory instructions.
2. Counting, weighing, or otherwise determining amounts of materials.
3. Listing the inventory.
4. Pricing the manufacturing inventory.
5. Calculating and extending the inventory.
6. Checking the inventory.
7. Comparing the inventory.

Inventory Instructions: The inventory instructions can be issued either in the form of typewritten sheets or as a booklet. They should be distributed long enough before the date of starting the inventory to permit a thorough study of their contents. Some plants even find it advisable to establish a sort of school of instructions in inventory methods for the benefit of those who will be employed in taking inventory.

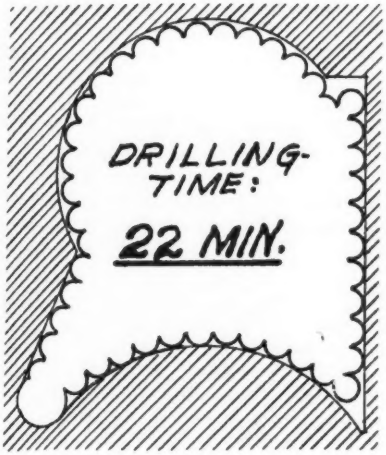
As regards the inventory instructions, care must be taken to guard against instructions which are loosely arranged. This fault can be avoided by grouping instructions for each department separately after the general instructions for all departments are set forth. The general instructions usually pertain to the following:

(a) The length of the inventory method.
(b) The personnel of the inventory committee.
(c) The articles to be taken.
(d) Special preparations.

Inventory Dates: The length of the inventory depends, of course, on the size of the plant. In large plants most of the departments cease operations during this period. In small plants, inventory can often be taken without stopping all work, but even in such cases the routine would be expedited if there were a complete cessation of operations.

Personnel of the Inventory Committee: The managers and department heads are on the inventory committee. The committee is assisted by all superintendents and foremen, by tagwriters who make out inventory tags and list the items thereon, and by workers who handle, count, or weigh the articles to be inventoried. Sometimes the accounting department

JUST COMMON HORSE SENSE!



This die was drilled out. Note the jagged edges. A maximum amount of time is required to file it down.

The same die, sawed out on the EXCEL Sawing and Filing Machine. A smooth cut requiring the minimum of filing.

Don't confuse the EXCEL with the ordinary filing machine. The EXCEL is a combination SAWING AND FILING MACHINE. It is this combination that will enable you to cut down your cost of making dies, screw-machine cams and odd-shaped parts.

Saw It Out --- Then File It
On the EXCEL

INDEX MACHINERY CORPORATION

49 CENTRAL AVENUE **CINCINNATI, OHIO**

Index-O-Automatic Screw Machines—Boley Multi Spindle Drillers and Tappers
Deckel Universal Tool Millers—H. & H. Automatic Tappers
Collets — Feed Fingers

supervises the taking of the inventory. In some plants charts are prepared showing how the plant is organized for taking inventory and such charts usually prove of great assistance.

Articles to Be Taken: The names, definitions, and locations of the broad classes of articles to be taken, such as raw materials, supplies, machinery and equipment, furniture and fixtures, work in process, finished products, and so on, are set forth in the inventory instructions.

Special Preparations: The heads of the various departments are instructed to make certain preparations and to furnish the supervising authority with a list of the names and clock numbers of the clerks and laborers needed in order to take inventory in their respective departments. In order to expedite the work, various departments are assigned definite tasks as enumerated below.

Inspection Department: The inspection department is instructed to clean and inspect goods and work in process. This department also makes a list of defective material capable of correction through repairs.

Salvage Department: The salvage department is directed to prepare a list of all obsolete and scrap material. This material is sent to scrap store houses if it cannot be corrected. Later the scrap is disposed of by the purchasing department with the aid of the inspection department. If scrap can be corrected, it is retained in the salvage department until inventory is completed, then is transported to the proper department for correction with a "corrective work order" attached. The salvage department moves goods sold but unshipped, for which shipping orders have been prepared, to storage places provided.

Productive Departments: The production departments are instructed to clean up all spoiled, defective, or scrap goods, to sort and bring together all like job numbers, to put all articles in proper receptacles, and to send scrap to the salvage department. In short, the production departments make a general "housecleaning." Production departments should minimize requests for materials during the days which immediately precede the beginning of the inventory period, and should bring all work in process so far as possible to the same stage of completion.

Storeroom Department: The storeroom department is ordered to clean up, to sort and stock its material, and to place all articles in proper receptacles, marked so as to be readily identified. Scrap and obsolete material is weeded out and sent to the salvage department. Deliveries from storeroom to factory should cease or slow down several days prior to inventory.

Purchasing Department: The purchasing department is instructed to draw up a list of unfilled purchase orders and contracts, arranged according to part numbers or names of material as of the closing date of the inventory period, say December 31st. All purchase invoices in dispute are promptly adjusted with vendors and sent to the accounting department before December 31st. Invoices passed for payment prior to December 31st are recorded on the books, and goods covered thereby are considered as a part of the inventory, even though not yet received. If seller's invoices have not come in, memorandum invoices are made out by the purchasing department and sent to the accounting department for goods received prior to the beginning date of the inventory period, say December 28th. All invoices which have been received from goods still in transit should be segregated and listed

Thirty-seven years behind the Wheel

ZIP! . . . ZIP! . . . WHE . . . ee! . . . SQUE . . . e . . . ee . . . eek! That's an echo of the Safety Grinding Wheel and Machine Co. of 37 years ago . . . hardly distinguishable in the din of industry.

BURR . . . RR . . . RR . . . URR! . . . SHRIE . . . EE . . . EE . . . EEK! . . . the same voice today with whiskers in it . . . reverberating in shops and factories as countless as the flying sparks.

When our growing pains let up, we decided to gouge out a front-rank place for ourselves. We did . . . we got "years ahead." Then we dug deep into the gray matter. With our hard pates to the grindstone we produced "The SAFETY Collar System."

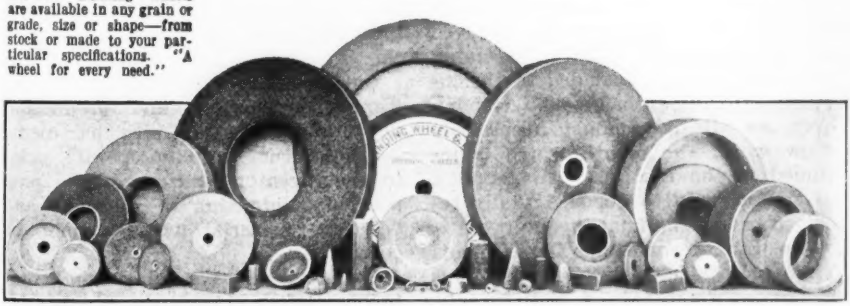
That saved so many lives we decorated our chests with two honors . . . the first motor-driven portable grinder . . . and the amazing "Rite-Speed" machine which gives you a robot type of service.

Then a tough hombre came out with a metal as hard as two first sergeants. But we ground it! And when manufacturers went "dizzy" over speed, we prescribed the only remedy . . . "Safe-T-Bond" high-speed wheels.

Problems? No matter what size or shape they are, shoot 'em on. We've got the answer book . . . crammed full of experience.

Write for complete information. Let us show you how to increase profits in your shop. Mail the coupon today!

SAFETY Grinding Wheels are available in any grain or grade, size or shape—from stock or made to your particular specifications. "A wheel for every need."



Pin this to your letterhead

THE SAFETY GRINDING WHEEL & MACHINE CO.
2338 COLUMBUS AVE., SPRINGFIELD, OHIO.

Tell us more about how we may be able to reduce our grinding costs.

.....
(Name)

separately. These may or may not be taken into consideration, but it is sometimes good practice to do so, as goods shipped f.o.b. seller's works are, according to law, the property of the buyer when in transit.

The purchasing department requests outside concerns which have in their possession certain materials, tools, patterns and so on belonging to the company which is making the inventory to submit sworn statements covering such articles. It also requests them to furnish a list of the above assets which they may have shipped back to the company a number of days prior to December 31st. The purchasing department is urged to minimize the amount of material received during the inventory period. One way to help in this respect is to slow up delivery by ordering goods that are ordinarily carried by express to be sent by freight.

Receiving Department: The receiving department is directed to clear its floors of all goods received up to time of starting inventory. Receiving records covering such goods are to be completed and quickly forwarded to the accounting department. Goods received after inventory has started are sometimes kept in the receiving room but are not included in the inventory. This is bad practice, however, as all dates must necessarily show as of the month which is included in the records. This applies, of course, only to goods actually received before the final inventory date.

General Accounting Department: The general accounting department is instructed to obtain a list for the sales department of goods billed but unshipped prior to December 31st, so that these goods will not be included in the final inventory. The goods may be inventoried, but the figures are subtracted from the "total" inventory to give the amount of the inventory to be used in preparing statements, and so on.

If the general accounting department supervises the taking of inventory, it will have charge of all the tags and inventory sheets. Acting in this capacity, it will charge the tag-writers with the tags and sheets as issued and credit them with returns. The fact that tags are serially numbered helps the general accounting department to keep its records straight. When inventory has been taken, tags are returned to this department. There they are checked by serial numbers and are then sent to the cost accounting department.

Cost Accounting Department: The tags which the cost department receives from the general accounting department are sorted by classes. From these tags inventory sheets are prepared. The cost accounting department is instructed to charge all manufacturing costs incurred before December 31st to the various classes of orders. It must see that price records are up-to-date so that goods may be priced correctly. The cost accounting department or the inventory committee is ordered to price, calculate and extend, check and compare the inventory.

Co-operation of Departments: The inspection, salvage, and production departments—in fact, all departments—are instructed to co-operate prior to the inventory period for the purpose of minimizing the obsolete and defective material which cannot be corrected.

Counting and Weighing the Inventory: Before inventory starts, instructions are issued and studied. Each employee knows what he is to do. When the signal is given to begin, the workmen commence to count, weigh, measure, or size inventory items. Goods should be counted, weighed, and so on, twice before the

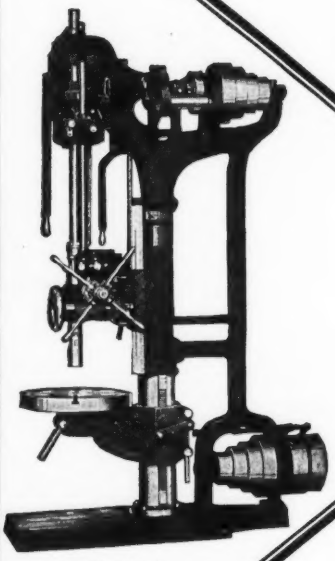
KOKOMO
HI-SPEED

Another good thing to remember before installing additional drilling equipment:

SUPERIOR

"QUALITY"

DRILLING and TAPPING MACHINES—



25" KOKOMO
HI-SPEED
Code: Bush-Tap

—emphasize their *"Superiority"* in terms of quantity *"Production."*

Your request will bring an explanation of our **SUPERIOR** *Drilling and Tapping service.*

SUPERIOR MACHINE TOOL CO.

KOKOMO [Since 1902] INDIANA

Inventory Counters Tag No.....

Part No. (or Size).....

Name .....

.....

MATERIAL AND SUPPLIES

Inventory Counters Tag No.....

Part No. (or Size).....

Name .....

Description .....

Dept..... Sec..... Bin.....

Unit of Count.....

First Count..... Made by.....

Checked by .....

IN	IN	IN	TOTAL

Stock Ledger Quantity .....

Physical Count Reported	Physical Count Accepted	Unit Cost	Inventory Value

.....

Inventory Counters Tag No.....

Dept..... Sec..... Bin.....

Made Out by.....

.....

OUT	OUT	OUT	TOTAL

.....

FORM 1. Inventory Tag for Material and Supplies (face and reverse). Size, 3½ x 7.

tags are filled out, to insure accuracy.

Listing the Inventory: The results of counting, weighing, or measuring are recorded in indelible pencils on the tags by clerks known as tag-writers. The tags are procured from the supervising authority.

Each tag for material is made in two sections, numbered serially and with perforated stubs in duplicate on both halves, and perforated between the sections. A wire provides for attaching the tag to the material. As soon as a lot or section of material is inventoried, the tag is attached by the tag-writer to the lot or section, then the lower half is torn off and sent to the supervising authority. If a receptacle is empty, a tag marked "empty" is placed therein. Every tag

A Special FORMICA GEAR

Silent Machines Are Well Maintained Machines

for TEXTILE MACHINERY!

This combination spur and mitre gear designed for use in a textile mill is an example of adaptability of Formica gear material to gears of all sorts and types.

Formica makes machinery operate more silently. It helps to sell new machinery and helps to keep old machinery operating more smoothly and quietly.

THE FORMICA INSULATION COMPANY

4632 SPRING GROVE AVENUE CINCINNATI, OHIO

FORMICA

Inventory Counters Tag No.....

Part No. .....

Name .....

.....

WORK IN PROCESS

Inventory Counters Tag No.....

Order No..... Dept.....

Part No. .....

Name .....

Description .....

Condition (No. and name of last operation) .....

Unit of Count.....

First Count .....

Checked by .....

MATERIAL

Physical Count Reported	Physical Count Accepted	Unit Cost	Value

LABOR AND BURDEN

Labor	Burden Hours	Burden Rate	Burden Amount

.....

Inventory Counters Tag No.....

Dept..... Location.....

Made Out by.....

FORM 2. Inventory Tag for Work in Process. Size, 3½ x 7.

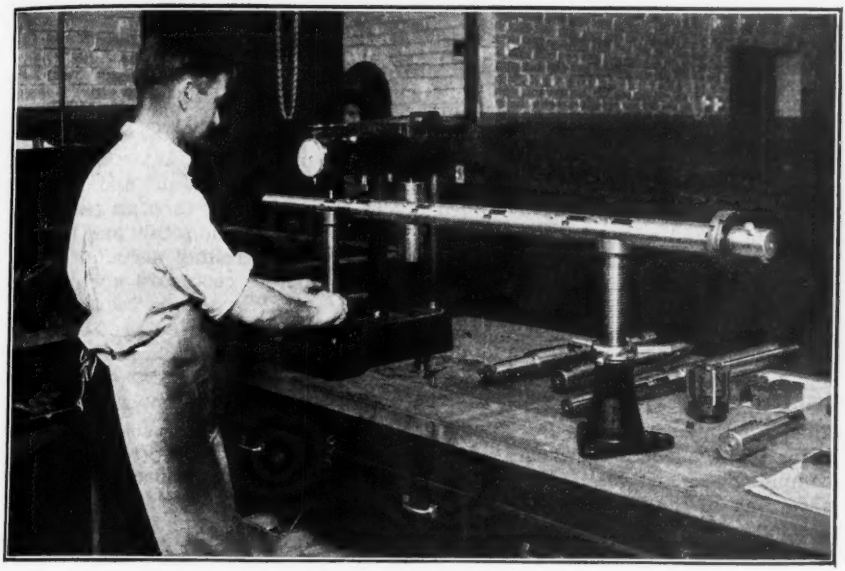
is accounted for. None should be lost, destroyed, nor borrowed. Spoiled tags should be marked "void" and sent to the supervising authority. Sample forms of inventory tags are shown in forms 1 and 2.

Most of the data on the tags is self-explanatory. Form 1 is an inventory tag used for material and supplies. The tag for finished material is of practically the same form.

Form 2 is an inventory tag for work in process. It requires some explanation. Assuming that the standard operations on the work in process which is being inventoried are known, it is sufficient to enter in the designated space only the number and name of the last operation. This shows the condition of the work in process. If the sequence of operations is not known, however, it is necessary to count the number of pieces of work in process completed under each operation and to show in detail the operation completed on each piece.

The "Condition" or "Last Operation Space" is for information as to whether the goods are new, old, or usable. It is good practice sometimes to assign one or more men who are familiar with conditions to special departments so that materials may be accurately described and last operations properly designated. Metal tags rather than paper tags are attached to machinery and equipment, to furniture and fixtures, and also to assemblies.

As soon as inventory is completed in each department, the supervising authority is notified. Representatives of the supervising authority visit each department to see if everything has been inventoried. If so, tag-writers and others who have been working there are released and are assigned, if necessary, to other departments. The next step in inventorying is to pull—or detach—the original tags. No tags are pulled without the order of the supervising authority. After the tags have been pulled in a department, regular operations may be resumed, provided they do not interfere with work in other departments. Tags pulled are sent to the supervising authority and compared with the duplicates. Each duplicate must be mated, which means that each orig-



Rockwell Hardness Tester

WHILE many Rockwells are used for testing the small parts of typewriters and computing machines, there are hundreds of other Rockwells employed for testing large tools and machine parts.

For example, we illustrate one of the uses of the Rockwell at the plant of the Kelly-Reamer Company, Cleveland, Ohio.

WILSON-MAEULEN CO
INCORPORATED

Concord Avenue and 143rd Street New York

inal must be found and turned in. If the tags do not agree, a recount of the material represented by the tag is ordered, if the discrepancy is large enough to warrant a recount. Someone other than the person who took the original inventory makes the recount.

After the tags have been pulled, they are sorted according to the balance sheet classification of assets. The tags not only show quantities but also show unit and total prices. In such cases the data on tags is entered on inventory sheets (forms 3 and 4) which are in the charge of the supervising authority. After sheets are filled out they are sorted according to numerical sequence, are checked as to completeness, and are then re-sorted according to the balance sheet classification of assets. That is, all raw material items appear in one batch of sheets, work in process in another, and so on. The complete inventory is then recapitulated on summary sheets, consecutively numbered—one sheet showing the totals of each asset.

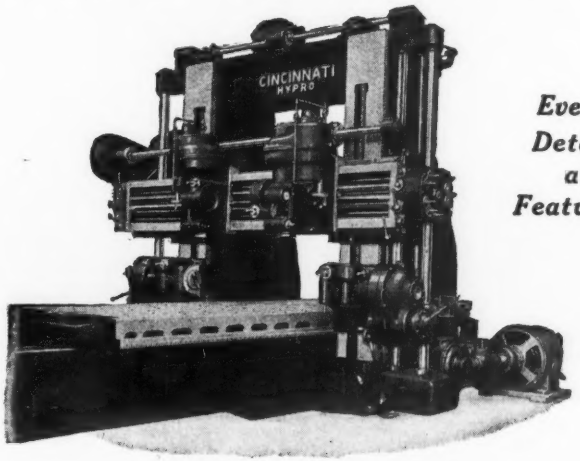
Pricing the Manufacturing Inventory: The pricing of the manufacturing or work-in-process inventory must necessarily be effected through the current cost records. Each order representing work in process has its time cards and requisitions filed in the work-in-process files, and if a physical inventory is taken, the notations on the physical inventory as to operations completed should agree with the information given by the cost files as to number of pieces completed under each operation, which also gives the cost of same. The requisitions should, in like manner, account for the direct material cost and that which is on the floors in process, thereby taking care of this feature.

In adding up the time cards in the files and extending these totals on the inventory sheets representing the work in process, the extensions of the burden at the standard rates for each department will furnish the total of the work-in-process burden or overhead. With these three items of work-in-process cost ascertained from both the physical count and the current cost files, it is then an easy matter to arrive at the totals and thereby check the controlling accounts in the ledger. These costs are always carried at what is shown in the work-in-process files, it being absolutely impossible to alter them to agree with any market conditions as any change would be altogether impossible to accomplish.

Use of Records in Pricing: Raw material may be priced from stock record sheets, purchasing department records, accounting department records, market quotations, or by the engineering department or the works engineer.

It is sometimes claimed that work in process is difficult to inventory. If material requisitions and time tickets have been properly filed behind orders in the standing order files, or posted to cost sheets, the calculation of work-in-process values is simply one of arithmetic. In some plants cost sheets are not filled out until orders are completed, in which event the order files rather than cost sheets must be resorted to in figuring work-in-process inventories. This is the preferable method. Under process systems the stage of completion of work-in-process is ascertained, the total cost of each process is ascertained, and the total cost of all processes is calculated. Work in process cannot be so easily figured under an estimating system. Finished parts and finished products are priced from individual part cost sheets, assembly cost sheets, estimated records, or stock record sheets.

NEW CINCINNATI HYPRO PLANER MILLER



Every Detail a Feature!

Frictionless and vibrationless drive through Silent Chains

Both the vertical feeds and the two transverse milling heads of this new Cincinnati Hypro Planer Type Miller are efficiently operated through Silent Chain drives.

This patented silent chain insures a smooth flow of power to the cutting tools at all speeds.

Ask Hypro Engineers to detail this and the many other features of the Hypro Planer Type Miller.

Other features of the Hypro Planer Type Miller:

Complete Electrical Control.
Independent Rapid Traverse to All Heads.
Independent Power Feed to All Heads, Rail and Table.
75 Feed and Spindle Speeds.

THE CINCINNATI PLANER CO.

3100 SOUTH STREET CINCINNATI, OHIO

PHYSICAL INVENTORY Page No.....

.....MATERIAL..... Period Ended.....

PHYSICAL COUNT							Stock Ledger		DIFFERENCE			
		Description							Over		Short	
Tag No.	Quan.	Part No.	Name	Price	Unit	Value	Quan.	Amount	Quan.	Amount	Quan.	Amount

FORM 3. Inventory Sheet for Material and Supplies. (Size 11 x 14.)

PHYSICAL INVENTORY WORK IN PROCESS Page No.....

Dept..... Period Ended.....

					MATERIAL		LABOR		BURDEN			
Tag No.	Order No.	Part No.	Name	No. of Pieces	Unit Price	Unit Amount	Last Oper. No.	Amount	Hours	Rate	Amount	Remarks

FORM 4. Inventory Sheet for Work in Process. (Size 11 x 14.)

All
be pri
ing
should
proce
produ

Fin

The s
of ca
and c
of th
the u
All c
should
tensi
3 is
sical
plies.
ished
is an
inven
copie

Appl

ing
ers,
wedg
and
struc
would
instr
tical
ation
locom
of r
locom
gaug
valve
wedg

To
the
mod
jack
com
tive
out
oper
the

All of the above inventories should be priced at manufacturing cost. Selling and administrative overhead should not be capitalized in work-in-process, finished parts, and finished product inventories.

Final Steps in Taking Inventory: The supervising authority has charge of calculating, extending, checking, and comparing the inventory. Much of the detail work is facilitated by the use of various mechanical devices. All calculations on inventory sheets should be made twice, and the extensions and figuring checked. Form 3 is an inventory sheet for the physical inventory of material and supplies. The same form is used for finished material or product. Form 4 is an inventory sheet for the physical inventory of work in process. Two copies are made for each inventory sheet, the copies remaining together until the inventory is priced. They are then separated and given to separate clerks who extend the values separately and independently. The sheets are then brought together and the extensions compared, a method which will immediately expose any difference in extension requiring correction.

After the totals of the sheets which represent the material covered by each controlling account are ascertained, the controlling accounts may be verified and whatever adjustments are necessary can be made. The inventory sheets are then separated and made up into books, one copy being filed away as a permanent record and the other used for current purposes in connection with stock records, and so on.

Apprentice Training at Beech Grove

(*Continued from page* 22)

ing 100 pages of instruction on levers, pulleys, inclined planes, screws, wedge hydraulic jacks, and so on, and covering practically the same instruction in solid geometry that would be received in high school. This instruction is followed by short practical courses on the design and operation of pumps (both water and air), locomotive valve motion, strengths of material, counterbalancing, and locomotive appliances such as steam gauges, lubricators, injectors, safety valves, superheaters and shoes and wedges.

To accompany these last courses the school room is equipped with models of levers, an inclined plane, jacks, pumps, a small lathe, locomotive valve motions, and different locomotive appliances with sections cut out to show the working of internal operating parts. Colored charts of the locomotive and air brake details are used to illustrate the construction and workings of these parts.

A special and very thorough course in gear design is included in the machinist and patternmaker course, consisting of instruction in gear terms and formulas for figuring gears, and also a course in drawing and designing gears of different types.

After an apprentice has completed the first course in mathematics he is given subsequent lessons as fast as he is able to finish them and prove to the instructor that he understands each problem thoroughly. No special routine is followed in assigning the lessons, but the courses assigned are selected to fit in as closely as possible with the kind of work the apprentice is engaged upon in the shop. The term of indenture consists of 1200 days—practically four years—upon the completion of which the student is given a certificate signed by the officials of the railroad, entitling him to the journeyman's rate of pay for his trade.

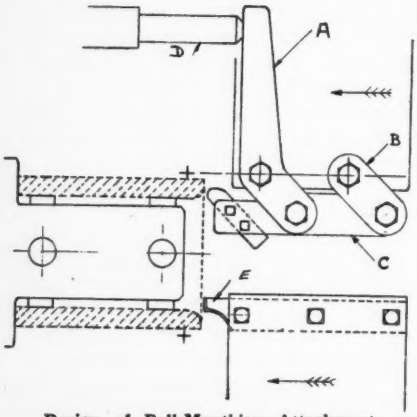
Ideas From Readers

This department is a clearing-house for ideas. If there is a "kink" or short-cut in use in your shop, send in a description of it. We will pay $5 for each one published.

Bell-Mouthing Attachment

By A. R. KLING

THE large bushing shown by shaded lines in the drawing has a small radius or bell mouth at one end. When the machine was originally tooled up for this job, it was assumed that the forming tool shown at **E** would perform its function satisfactorily. Actual practice indicated, however, that it would be necessary to take an additional finishing cut with a single point tool, due to excessive chatter caused by the long cutting surface of tool **E**. The center of the radius being but ¼ in. from the outside or periphery of the bushing, it was found impossible to get a simple swinging tool in, consequently recourse was had to the double link attachment shown.



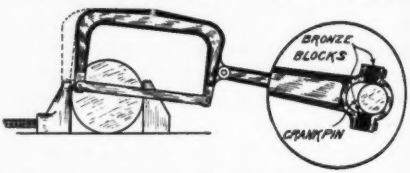
Design of Bell-Mouthing Attachment

The device consists of two links, **A** and **B**, the fulcrums of which are in line with the conterline of the desired radius. The ends of the links are attached by studs to the bar **C**, which carries the single point tool. When the rear slide on which the attachment is mounted feeds forward, an arm of link **A** strikes the fixed rod **D**, causing the tool to swing in on the correct radius. The original forming tool **E** was retained on the front slide but is now used for roughing only.

A Power Hacksaw "Kink"

By R. H. KASPER

A NUMBER of discs of large diameter were required to be cut from bar stock by the use of a power hacksaw. Although the vise was large enough to hold the piece, it was found that the outer end of the saw frame would strike the work as it neared the center of the cut. Sawing part way through and finishing with a hand saw would have been too slow, so the following method, though it necessitated a slower speed, resulted in the satisfactory completion of the work.



Power Hacksaw with Two Bronze Blocks in the Connecting Rod Bearing to Shorten the Stroke.

The cap on the large end of the connecting rod was removed and two

MORSE TOOLS

Increase Production and Reduce Tool Costs

This tool has a double bearing —one on each side of the hexagon drive — assuring perfect alignment.

A small spot facing cutter is used in the ground hole.

On the New UNIVERSAL CAR!

HERE is a special MORSE Tool which helps to maintain the high production schedules necessary to meet the increasing demand for the new universal car. The tool is especially designed to finish two diameters of the universal car water pump chamber in the cylinder head.

Besides the increase in production, it made a saving of 10 to 1 on tooling cost for this operation. 10 to 1—because it costs just half as much as the tools formerly used and lasts exactly five times as long.

MORSE Tools will do as much for you. Send us a blue print of your requirements and let us submit our recommendations.

MORSE COUNTERBORE & TOOL CO.

12281 TURNER AVE. **DETROIT, MICH.**

bronze blocks were inserted under it, as shown. When the machine was in operation, the crankpin revolved in an elongated hole, permitting an amount of lost motion equal to the thickness of the blocks. The lost motion shortened the stroke so that the outer end of the saw frame reversed at the point shown by the dotted lines in the drawing, whereas the full stroke would have carried the frame to the point shown by the solid lines. The bronze blocks should rest on the crankpin, as shown, so that the dead center will be passed and the reverse stroke begun smoothly.

Gummed Letters For Tracings

By ROSWELL KENT

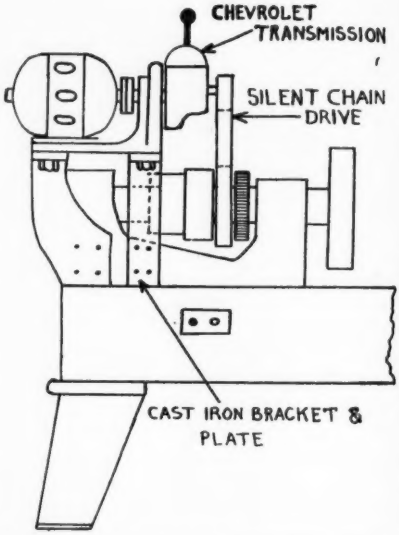
A LARGE part of the time that is spent in doing a really good job of tracing is usually devoted to putting in the dimensions. Good lettering takes time. Moreover, it frequently happens that the draftsman who is best at drawing or tracing is a poor hand at lettering.

A number of firms have abandoned the hand method of lettering in favor of standard gummed letters and numerals. The gummed letters can be stuck onto the tracings much quicker than would be possible for anyone to letter by hand, and the letters and figures are uniform. They can be purchased in practically any size desired at any good stationery store. In certain classes of work it is common practice to make a tracing and then vary the dimensions without changing the drawing, as, for example, in sending out proposals calling for bids on a product which is standardized except for a minor modification. In such instances considerable time can be saved by using a standard tracing and changing the dimensions with gummed letters.

Modernizing An Old Machine

By M. J. KUNERT

WE have been modernizing our shop as fast as possible by installing direct motor drives wherever such drives were practicable, and have not only ordered motors with all new equipment, but have attempted to install motors on the old equipment



A Chevrolet transmission provides speed changes on this old 14-inch lathe.

also. In many cases we have found this impossible owing to the high costs of special attachments and gear boxes.

Our progress in this direction was apparently stopped, when we had the happy thought of motorizing our old machines with old automobile transmissions. An example of the result is shown in the illustration. We purchased an old, but good, Chevrolet transmission from a scrap dealer and mounted it on a 14-inch engine lathe as shown, together with a 3 h. p. ball

No. 1018 Chair

No. 12-24 Cabinet

No. 35 D.S.B. Revolving Stool

SECURITY

ANGLE AND SHEET STEEL FACTORY EQUIPMENT

All-Purpose, Useful, Long-Lived!

INVEST in Angle Steel Equipment. Invest in permanence, strength and economy. No "time out" for repairs and replacements here.

No. 1018 Chair. Comfortable saddle seat, 14½" square, hardwood. Triple steel backrests, attached to continuous rear posts. Ball-turned feet on angle steel legs. Six heights, 16" to 26". Mahogany or oak finish seat. Steel, olive green enamel finish.

No. 12-24 Cabinet. Contains 12 drawers in one tier. Height, 51"; Width, 26½"; Depth, 18½". Drawer size: 24" wide, 18" long and 3" high, inside.

No. 35 D. S. B. Revolving Stool. Hardwood backrest, 6" by 14", riveted to spring steel pillars. Steel adjustment screw and adjustment parts of malleable iron. Hardwood seat, 14½" in diameter, 1⅛" thick. Heights: adjustable, 22" to 27"; 26" to 31"; 30" to 35"; 34" to 39".

Mail Coupon for Catalog "C-M.S." 112 pages of shop and office equipment from which to choose.

SPECIAL WORK in our field built to your plans.

ANGLE STEEL STOOL CO.
PLAINWELL MICHIGAN

Agents and Dealers in Principal Cities

MAIL TODAY

COUPON—Check, attach to firm letterhead, then mail!
ANGLE STEEL STOOL CO., Plainwell, Mich.

☐ Send an experienced shop equipment engineer.
☐ Send New Catalog "C.-M.-S." of Angle Steel Equipment.

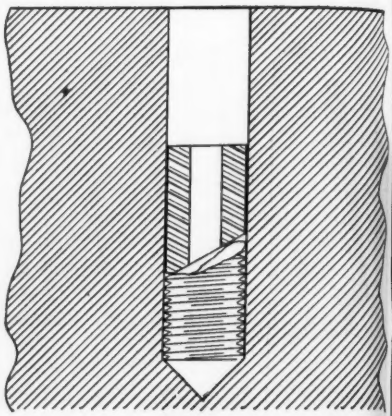
Name.....
Address.....
City..... **State**.....

bearing motor and silent chain drive. The entire job was done at a cost of not over $140.

Centering Broken Studs

By RICHARD H. KIDDLE

THE pencil sketch herewith shows the method we developed for centering broken studs, so that a hole could be drilled in the stud for the "ezy-out" without running the chance of breaking a drill. These studs are in large castings, and when a stud breaks we have to use a ½-in. electric drill to drill the hole for the ezy-out. The hole shown is 6 inches deep, with approximately 2 inches of broken stud in the bottom of the hole. These studs always break at the start of the threads, and usually break so that a rough, slanting surface is left in which it is very difficult to start a drill. The drill will run "down hill" on the slant and will usually break. A broken stud can be drilled out with a ratchet drilling outfit and a full size drill, but this operation usually damages the threads in the stud-hole.



A bushing aids in centering the drill for drilling a hole in a broken stud.

We solved the problem by making a bushing which is a slip fit in the hole and is just the right size for the ½-in. drill. The bushing can also slant at one end, so as to afford closer contact on a slanting stud. The idea is simple, but effective, and the ezy-out usually works, even on a stud more than twice its size.

Boston Navy Yard

(*Continued from page* 14)

which is said to be approximately double that of ordinary chains.

Although the U. S. Frigate Constitution, being almost entirely of wood, can afford no material for an article of this kind, our readers may be interested to know that the work of rebuilding "Old Ironsides" is about 70 per cent completed. The famous old warship is shown in Fig. 11, in the drydock which she christened in 1833.

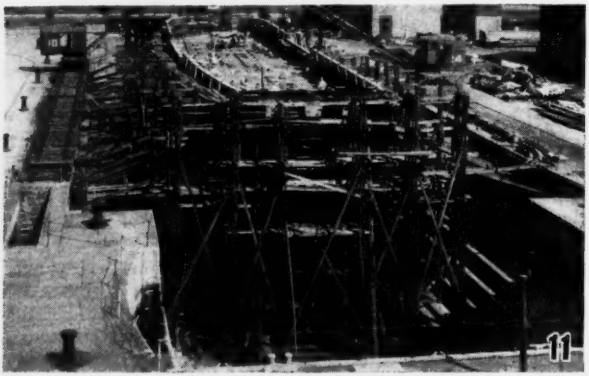
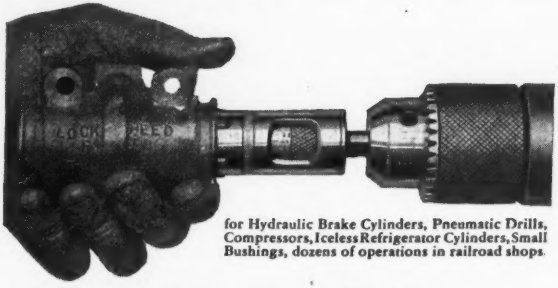


Fig. 11—The U. S. S. Constitution in the drydock which it christened in 1833. The work of rebuilding "Old Ironsides" is 70 per cent completed.

Hutto Grind *"the factory way"*

New
HUTTO
CYLINDER GRINDER



for Hydraulic Brake Cylinders, Pneumatic Drills, Compressors, Iceless Refrigerator Cylinders, Small Bushings, dozens of operations in railroad shops.

Ideal for small bores 1¼" to 1⅞" in diameter

If you have limited production—or if you do service work—the new Hutto Model "BT" Grinder should prove a good investment.

This precision grinder will enable any operator to make cylinders straight and round—and as a tool room requisite the "BT" is especially useful for taking out tight spots in hardened bushings et cetera.

Any half-inch electric drill furnishes more than ample power to remove stock quickly and easily.

A micrometer adjustment affords instant and positive setting—and six sets of stones take care of a range 1¼" to slightly over 1⅞" in diameter.

Our engineering facilities and experience are at your service at all times without obligation on your part and an analysis of internal grinding problems will be cheerfully undertaken. Experienced factory representatives are always available to install Hutto equipment and properly instruct the operator in its use upon installation.

Model "BT" Grinder, in box with one set of stones $55.00
Extra sets of stones—any size—1¼"—1⅜"—1½"—1⅝"—1¾"—1⅞", per set 5.00

HUTTO ENGINEERING COMPANY
INCORPORATED
542 Lycaste Avenue Detroit, Michigan

MODERN Machine Shop

HOWARD CAMPBELL - - *Editor*

In the Cold Gray Dawn

THE collapse of the stock market —probably the worst debacle of its kind since Jim Fisk tried to corner the gold market—has created a considerable amount of apprehension as to the possible effect on business and industry.

A study of the situation discloses that the casualties have been mostly individual, and that the effects upon industry have been only incidental. Probably the most important effect is the redistribution of corporation ownerships, but this will have no effect upon supply and demand. Never before in the history of the country have American industries been better fortified as to cash on hand, condition of inventory, or soundness of corporate structure. There has been no inflation of commodity prices, nor has there been any crisis in the banking situation.

The high prices that have dominated the stock market have had nothing to do with the creation of business, but have, rather, been a reflection of it, magnified by extravagant expectations of profit through stock manipulation. While it is true that business has slackened more or less in some lines, the actual cause of the crash was the top-heavy condition of the market itself. A survey of business throughout the country shows that it is functioning in an orderly and healthy manner, without regard for the chaotic conditions existing in Wall Street.

Our unprecedented National prosperity has undoubtedly been a primary factor in the development of the confidence which fostered rash speculation, but even American industry cannot produce profits beyond a certain point. Dividends are based upon the earnings of industry—not upon the high prices paid for stocks by speculators who hope that, by some process of magic, the prices will mount indefinitely.

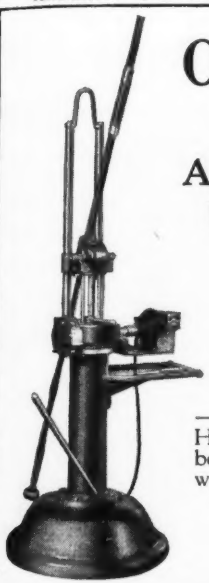
"Chief Engineer"

THE title of "Chief Engineer" by which President Hoover was known to his associates for many years seems entirely applicable in his present position. At the time of going to press the news reaches us that Mr. Hoover has foreseen possible contingencies which might arise from the collapse of stock speculation and from over-production in certain lines during the past year, and has taken steps to insure a continuance of prosperity. Thus far he has obtained assurances from the leaders of industry that all possible construction work will be undertaken as soon as possible, in order to provide employment and maintain the buying power of the country at normal. He has also obtained their promises that no advantage will be taken of slack business conditions to reduce wages, and at the same time has obtained the pledges of the leaders of organized labor that no new movements for wage increases will be started at this time.

As a successful engineer, Mr. Hoover is accustomed to thinking in terms of construction and to planning ways and means to co-ordinate human effort with materials to obtain the desired results. The advantages of having a man of this type at the head of our National business are becoming more evident every day.

ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS

ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS



Cut Scraping Costs 50%

with an

ANDERSON POWER SCRAPER

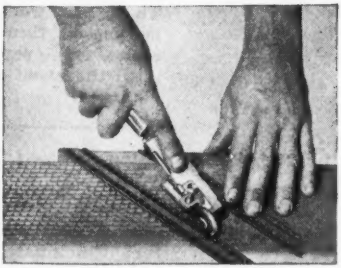
Electrically-operated from your light socket. One machine does the work of several men. Easy to operate—no fatigue. Natural Hand Control produces better work than can be done by hand. Ruggedly built—will withstand the hardest usage. Portable, yet rigid.

If your product has flat bearing surfaces you can't afford to be without this tool.

Send for Bulletin!

ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS

ANDERSON SPOTTER



Fast—accurate. Work is equal to and looks like good hand spotting. Can be operated by unskilled workmen. Quickly pays for tself.

Send for Bulletin!

Anderson Improved Balancing Ways

NO LEVELING REQUIRED

Hundreds used for balancing crankshafts, flywheels, pulleys, grinding wheels etc. No centers necessary. Five sizes, from 20-inch to 96-inch swing.

Send for Bulletin!

ANDERSON BROS. MFG. CO.

1926 KISHWAUKEE STREET ROCKFORD, ILLINOIS

ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS

ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS — ANDERSON TIME-SAVING TOOLS

New Shop Equipment

Cincinnati Floor-Level-Type Hopper for Centerless Grinding

Full automatic grinding on straight cylindrical work, such as piston pins, small rollers, short shafts, bushings, and so on is obtained on Cincinnati Centerless Grinding Machines by using the newly developed floor level type hopper recently announced by Cincinnati Grinders, Incorporated, Cincinnati, Ohio. By eliminating all manual feeding operations, this hopper makes it possible for one man to operate a battery of machines, his only job being to fill the work basin of the first machine and check the size and finish of the pieces being ground.

This hopper is individually motor driven. The variations in feed to suit the flow of work through the machine are obtained by means of a worm and wheel reduction, connected to the rotated carrier disc by means of interchangeable slip gears.

Cincinnati Centerless Grinder Equipped with Floor-Level-Type Hopper for Automatic Grinding

Work dumped into the work basin is carried upward to a delivery chute by a series of studs at the desired spacing to suit the work. The studs are mounted in a ring which is interchangeable on the main carrier disc. The timing of the hopper is so adjusted that the delivery of the work is slightly in excess of the machine requirements and a return chute is provided to return the surplus work back to the basin.

The hopper can be easily disconnected and removed from the machine. Because of its low level the hopper is adaptable to handle work through a series of consecutive machines, gravity being utilized to carry the work from one machine to the basin of another. Thus the work can be passed through a series of operations until the exact size is obtained.

U. S. Grinder with Graphitized Micarta Transmission

The United States Electrical Tool Co., 2471 West Sixth Street, Cincinnati, Ohio, is now building a new type of grinder in which the Gibbs V-Disc transmission of graphitized micarta is used to transmit power to the wheel spindle. The transmission is made of ordinary micarta, impregnated with graphite, and the discs are durable, accessible, and low in replacement cost.

One of the chief advantages of the machine lies in its ability to operate on alternating current. Tests of this type of drive, using alternating current, have

LE BLOND

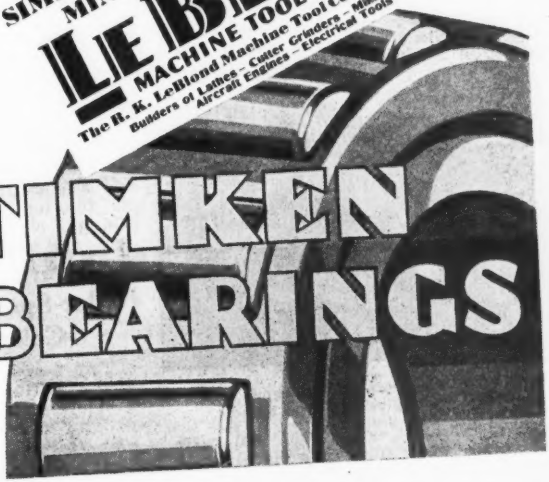
EVERY SHAFT

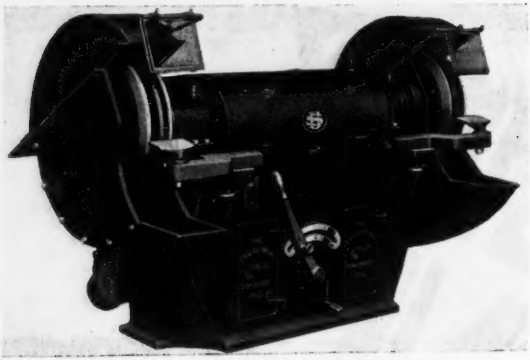
The combination of LeBlond engineering and construction with Timken Bearings assures superior performance.

MORE POWER
GREATER RIGIDITY
PERMANENT ALIGNMENT
SIMPLE BEARING REPLACEMENT
MINIMUM MAINTENANCE

LE BLOND
MACHINE TOOL DIVISION
The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio
Builders of Lathes - Cutter Grinders - Milling Machines
Aircraft Engines - Electrical Tools

on TIMKEN BEARINGS

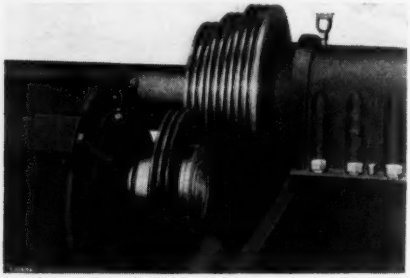




U. S. Grinder with Graphitized Micarta Transmission.

proved it to be highly efficient at all speeds and under load. It is positive, will not slip, and is free from backlash. Another advantage is its ability to maintain an average peripheral speed of 9,000 surface ft. per min., using high speed wheels down to the flanges. The two changes of speed which are available make it possible to increase the speed as the wheel wears. The speeds can be changed in a few seconds by means of a foot pedal and hand lever, both of which are conveniently located on the front of the machine as shown in the illustration.

The wheel spindle is of one-piece construction, of chrome-manganese steel, and operates in four H. D. SKF ball bearings which are enclosed in dust-proof housings. Push button control with no-voltage release and overload protection is provided, also unbreakable



View of Gibbs Discs that transmit power direct from motor to wheel spindle.

glass eye-shields, adjustable tool rests, and electric steel (or boiler plate) wheel guards. The grinder is made in four sizes, the largest to carry wheels 30x3 in.

Brown & Sharpe Wire Gauge Selector

The Brown & Sharpe Mfg. Co., of Providence, R. I., has announced two Wire Gauge Selectors, Nos. 698A and 698B, designed to simplify the gauging of wire.

These selectors cover up the slots in the wire gauge adjacent to the one being used, so that the one slot in the wire gauge for any particular size is made accessible for fast and easy gauging of a large number of pieces of wire.

The selector is easily and quickly attached to the wire gauge. The spring fingers of the selector arm snap around

B. & S. Wire Gauge Selector

the stud on the disk, holding the selector in place on the gauge. If desired, the selector is as easily removed. There are no screws or nuts to become lost.

Selector No. 698A is for use on Brown & Sharpe Wire Gauges Nos. 688 (5 to 36) and 690 (6 to 36); Selector No. 698B is for use on Brown & Sharpe Wire Gauges Nos. 688 (0 to 36), 690 (1 to 36), 692, and 694.

"Mor-Speed" 11-in. and 13-in. Column Radial Drills

Two new sizes of "Mor-Speed" Radial Drills, with columns of 11-in. and 13-in. diameters, have been added to the line of The Morris Machine Tool Co., Court and Harriet Streets, Cincinnati, Ohio. The machines are similar in design to the 9-in. column machines brought out about two years ago.

"SCULLY-JONES"

Self-Aligning Reamer Holder

for

Turret Lathes, Drill Presses Screw Machines

COMPENSATES for all irregularities in machine alignment. Reamer can float to one side, at the same time swing on an angle in any direction to align itself with the work.

ACCURACY and UNIFORMITY are qualities which emphasize the advantages of the peculiar floating action of this type of holder.

SELF-ALIGNING REAMER HOLDERS are made in five standard sizes for reamers up to 3" diameter. Adaptable to any style machine drive or reamer shank.

ORDER ONE ON APPROVAL.

Complete specifications in our Small Tool Catalog No. 36, which describes our complete line of "Wear-Ever" Production Tools. A valuable handbook for any machine shop.

Scully-Jones & Company

1909 S. Rockwell St. ***TOOL DIVISION*** **CHICAGO, ILL.**

Factory Representatives and Local Stocks:

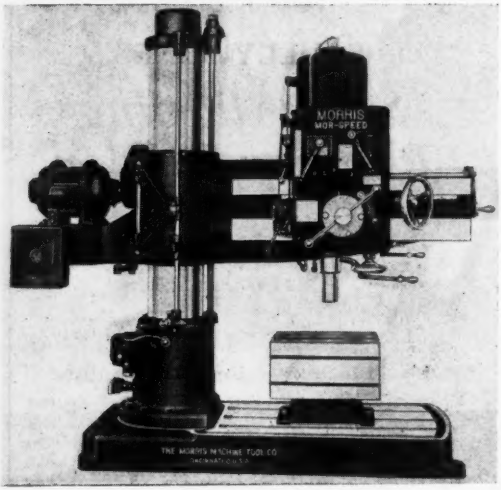
DETROIT, MICH.
Gross & Heming
1502 David Stott Bldg.

CLEVELAND, OHIO
Cleveland Tool & Supply Co.
1427-37 W. Sixth St.

NEW YORK CITY
L. C. Biglow & Co., Inc.
250 W. 54th St.

West Coast Representative
Jos. C. Fletcher
661 Folsom Ave., San Francisco

BUFFALO, N. Y.
R. C. Neal Company, Inc.
76 Pearl St.



"Mor-Speed" 13-in. Col. Radial Drill

The three sizes in which this machine is built are equipped with a 3 ft., 4 ft., and 5 ft. arms, respectively. The entire machine, including the elevating attachment, is operated by one constant speed motor, which is mounted on the arm. There are 27 speeds and 12 feeds, all of which are controlled from the head. This centralized control and direct-reading index plates make it possible for the operator to change speeds or feeds without leaving his working position. The driving clutch runs at a constant speed at all times, insuring maximum pulling power at the spindle.

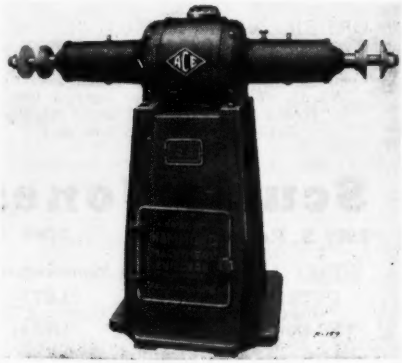
The arm is raised, lowered and clamped by the operation of a single lever, saving time and insuring safety. The inner and outer columns are mounted on special radial and thrust ball bearings, and anti-friction bearings are used throughout the machine. The head is perfectly balanced on the arm, and the taper gib is so placed as to assure easy movement of the head along the arm. The head is clamped on both sides with one movement and is brought up into the "V" at the bottom, assuring rigid clamping against the front face and "V" of the arm where it is most needed.

All moving parts of the machine are continuously oiled. The entire head runs in oil, a constant speed ball bearing pump bringing the oil to the top of the head through a sight feed oiler. The oil cascades through every moving part, all other parts being oiled from a central reservoir. Plain box or universal tables are furnished as desired.

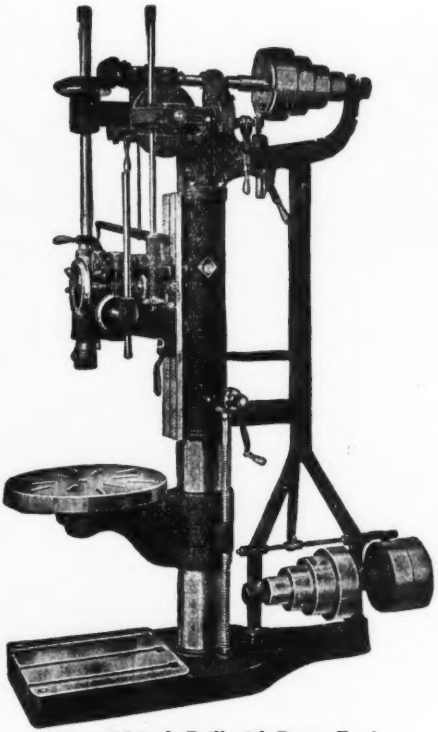
Hammond H. D. 4-Brg. Electrically - Driven Polishing and Buffing Lathe

The Hammond Machinery Builders, Inc., Kalamazoo, Michigan, have brought out the Heavy Duty Four-Bearing Electrically - Driven Polishing and Buffing Lathe shown in the illustration. This machine can be furnished in a complete range of sizes from 3 h.p. to 15 h.p. capacity. The motor, which is a 40-degree C. type, especially designed for this service, is totally enclosed with no holes or slots for ventilation. Clean air is supplied to the motor through a device known as "Air Clean" without piping to the outside. The motor is liberally proportioned, and will withstand a momentary overload of 100 per cent beyond its rated capacity without heating above 40 degrees C.

The one-piece manganese steel spindle is supported by four oversize ball bearings. The bearings are designed with



Hammond H. D. Four-Bearing Polishing and Buffing Lathe



Barnes 25-inch Drill with Power Feed and Automatic Stop.

Barnes

UPRIGHT

Drills

With Stationary Head—
15, 20, 22½, 25-inch swing.

—

With Sliding Head—
22, 26, 28, 34, 42, 50-inch swing.

—

Gang Drills—
20 to 26-inch swing.

Barnes Upright Drills are made in a range of sizes from the 50-inch swing, required in the railroad shop, to the 15 and 20-inch sizes used in the small machine repair shop and garage service.

Arranged for Silent Chain or Belted Motor Drive. With or without Power Feed.

Write for Our Circulars Giving Complete Information

W. F. and JOHN BARNES CO.

ROCKFORD, ILLINOIS

Upright Drills Screw Presses

Horizontal and Vertical Production Drilling and Boring Machines

convenient oil cut, oil level gauge, and flushing plug for convenience in removing old oil and replenishing. Double labyrinth seals with overflow gauge prevent dust from entering the bearing compartment and the oil overflow prevents surplus oil from entering into the motor compartment. The flat top spindle thread and spindle lock are standard equipment. Regularly supplied in 220, 440 and 550 volts, 25, 50 and 60 cycle, 2 and 3-phase alternating current. The machine will be supplied in 3, 5, 7½, 10, and 15 h.p. capacities. The 2-bearing machine is supplied in the 1½, 2, 3 and 5 h.p. capacities.

Cincinnati No. 2 Cutter Grinder

The machine shown in the illustration is a new No. 2 Cutter Grinder which has been placed on the market by the Cincinnati Milling Machine Co., Cincinnati, Ohio. This machine has a heavily-ribbed box-type bed, with a three-point support on the floor. A large and accessible compartment is provided for the motor. The table is located at a fixed height and fixed operating position for all types of cutter grinding. The table is mounted on a sensitive anti-friction roller bearing support, which facilitates operation. The table slide rides on two long roller chains, guided by four ball bearings—two on each end.

Cincinnati No. 2 Cutter Grinder

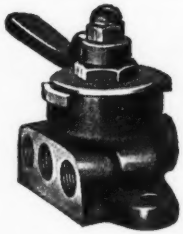
Accurate cross adjustment of the saddle is provided up to 10 inches by the use of the hand wheel at the left front side. The table proper can be swiveled, and is equipped with a graduated swivel dial, a scale reading taper in inches per foot, and a means for fine adjustment. The working surface of the table is 5¼x 36 in., and the movement in line with the centers is 18 in. Work of 10 in. diameter can be swung between centers. Work of 27 in. length can be held between the ends of the table, and a piece 21½ inches long can be swung between the right hand tail-stock and the regular headstock.

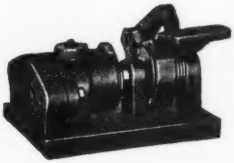
New style tooth rests can be attached for any kind of cutter grinding job. The grinding wheel spindle head is mounted on an adjustable column having both vertical and horizontal movements, the column being graduated to give an approximate swivel movement in degrees from 0 to 240. The maximum vertical adjustment obtainable is 7½ inches.

The grinding wheel spindle is driven by a special ½-h. p. 3425 r.p.m. motor which is supplied at the factory. The motor is mounted at the lower end of the column. The motor shaft and spindle are parallel and the drive is made through a straight belt that is neither twisted nor crossed. The two-step cone pulley provides for grinding wheel speeds of 3850 r.p.m. or 5735 r.p.m.

The shanks of end and face mills are held in a large workhead which holds them for sharpening just as they are held in the machines in which they are to be used. The head swivels in both vertical and horizontal planes, the Cincinnati Patented Clearance Setting Dial providing for direct and positive settings at any clearance angle desired. The spindle has the new National Standard Taper hole at one end and a B. & S. No. 12 Taper hole at the other end. Four taper collets are supplied to reduce the B. & S. Taper hole to smaller diameters.

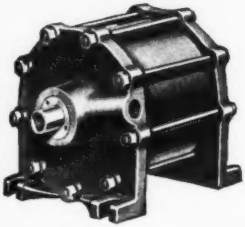
The machines are marketed as plain or universal, the universal machine consisting of a plain machine, plus a cylindrical grinding attachment, surface grinding attachment, gear cutter sharpening attachment, and an internal grinding attachment. The universal machine is supplied with a motor-driven workhead, a ¼-h. p., 1750 r.p.m. motor being used. Extra grinding wheels of various types are supplied. Floor space required, 4 ft. 10 in. x 5 ft. 10½ inches.





"LOGAN"

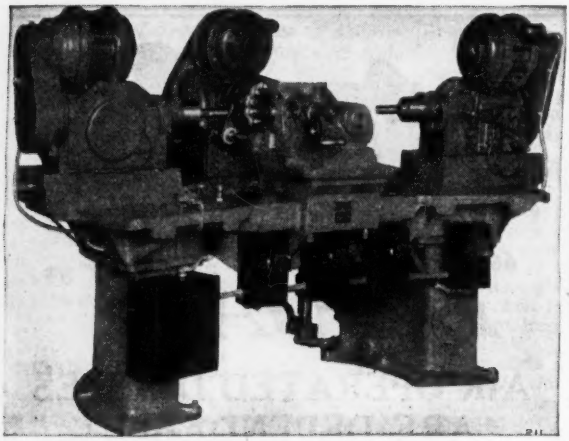
AIR OPERATED DEVICES ARE DEPENDABLE!



THE downright dependability of Logan Air Operated devices to stand up under severe strain and unusual conditions has made them the standard of quality.

They combine the maximum production with a minimum waste of time, effort, and motion on practically every type of machine.

Catalog R-23 describes the full line of LOGAN rotating and non-rotating cylinders, LOGAN Air Control Valves, LOGAN Air Chucks, and other LOGAN Air Operated equipment. Send for it—today!



Bradford Three-Head Drilling and Reaming Machine

Bradford Three-Head Drilling and Reaming Machine

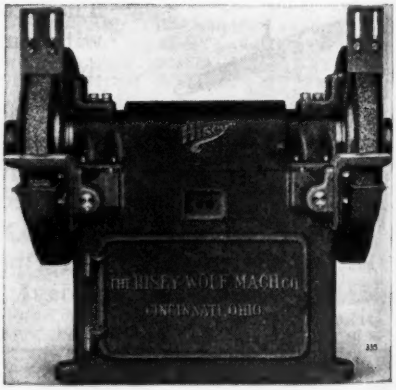
The machine shown in the illustration is a three-head drilling and reaming machine which has been built by The Bradford Machine Tool Company, 659 Evans Street, Cincinnati, Ohio, for use in the Dodge Brothers Motor Car Co.'s plant in Detroit. The machine is used to drill and ream twelve 23/64-in. holes in the flange of a differential case and ream two cross pin holes to .8625 in. diameter.

The piece is clamped in position by means of a quick-locking clamp, then the operator trips the hand valve mounted on the table at his left hand, which automatically trips the levers controlling the operation of all heads. All spindles advance simultaneously to perform their respective operations, after which they return to the starting point and stop, thus completing the operating cycle. The entire operation is completed in one minute, and one operator can handle from two to four machines.

Hisey High Speed TexDrive Grinding Machine

In order to eliminate the necessity of changing worn wheels in order to maintain a constant wheel speed, the Hisey-Wolf Machine Co., Cincinnati, Ohio, has brought out the High Speed TexDrive Grinding Machine shown in the illustrations. The machine is equipped with a 10 h. p. motor and is designed to use a 24-in. wheel, operating at 9500 s.f.p.m. When the wheel wears to 20 inches diameter, the spindle speed is increased so that the wheel surface speed is again 9500 feet per minute, and the machine is operated at this speed until the wheel is worn past usefulness.

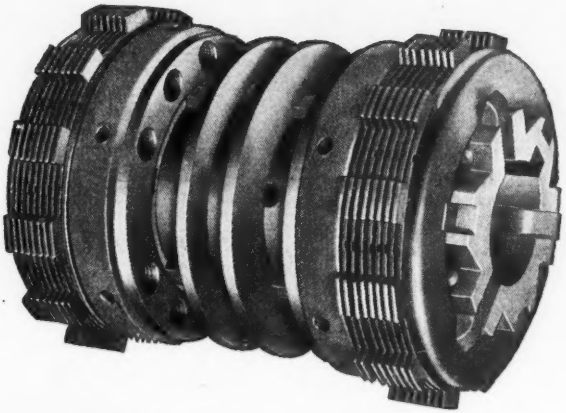
The speed changes are obtained by the use of the "TexDrive" belt and two sizes of pulleys. In order to change the speed, it is only necessary to move the wheel guard back, permitting the safety device to be shifted so that the TexDrive belt can be transferred to the smaller pulley. At the same time the motor is brought forward to relieve the belt tension, and is adjusted again after the change has been made.



Hisey High Speed TexDrive Grinding Machine

The motor is mounted on a sliding base, on which it can be moved forward or back as necessary. The motor starter is encased in a steel cabinet, which is mounted inside the column,

Compact, Dependable Reasonably Priced



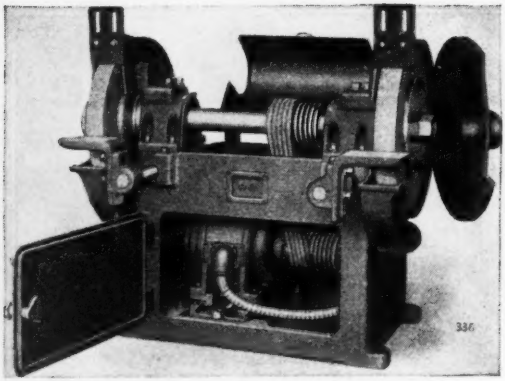
DESIGNING engineers are finding many advantages in the compact design of the new Model C. C. Twin Disc clutches. They can be housed with comparative ease in the limited and rather confined spaces usually available in machine tools. Capacities are large for the small space these clutches occupy.

Care and attention require little of the operator's time. All necessary lubrication is provided by running the clutch in a spray of oil. The infrequent adjustments needed can be made in a few minutes. One of our test clutches operated for 18 months without being touched.

These clutches can be furnished in the following sizes: 3½", 4½", 5", 5½", 6", 7" and 9". Complete information about dimensions and capacities will be sent on request. Write.

TWIN DISC CLUTCH COMPANY

RACINE WISCONSIN

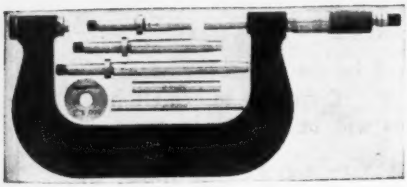


Machine with Guards and Door Open, Showing Accessibility

protected from dust. The push button control is mounted in the top front of the column, as shown. An extra large spindle, made of heat treated chrome nickel steel, is used and the wheel flanges are keyed to the spindle. Oversize ball bearings are used, although Timken bearings can be supplied without extra charge. A key extending along the entire length of the base of the bearing housing fits into a keyway on the top of the column, insuring perfect alignment. Dust covers at each end of the bearing housings are provided with labyrinth seals to exclude dust. Oil cups are provided at convenient locations.

B. & S. No. 54 Micrometer

The No. 54 Micrometer recently announced by the Brown & Sharpe Mfg. Co., of Providence, R. I., is a desirable



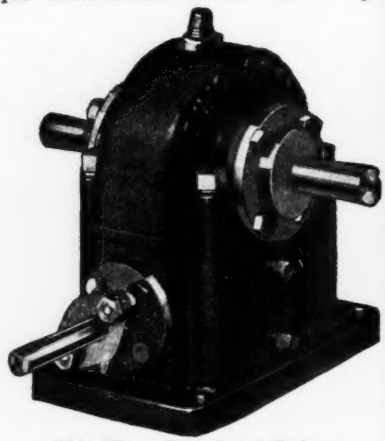
Brown & Sharpe No. 54 Micrometer

tool for many kinds of work. The tool is especially adapted for use in the automotive shop where its range, 0 to 4 in., by thousandths of an inch, includes practically all automobile parts requiring close measurement. Pistons, camshaft bearings, wrist-pins, crank-shaft bearings and pins, and many other parts are measured quickly and accurately with No. 54.

The four interchangeable anvils furnished with this tool make it adaptable for work for which four micrometers were formerly required. The No. 54 is furnished with ratchet stop and set of three standards, unless otherwise ordered. The tool is packed in a finished wooden case.

Ohio Worm-Gear Speed Reducer

The outstanding feature of the Ohio Worm-Gear Speed Reducer is the unique construction which makes it pos-



Ohio Worm-Gear Speed Reducer

sible to obtain practically any ratio between 6-to-1 and 100-to-1. This speed reducer, recently placed on the market by the Ohio Gear Company, 1333 East 179th Street, Cleveland, Ohio, is built in a series of four sizes: No. 0, 1, 2 and 3, the largest of which is rated at 2 horsepower.

To give a very smooth and efficient

Sheldon 90° Angle Plates

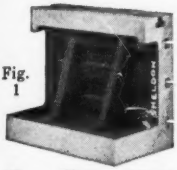


Fig. 1

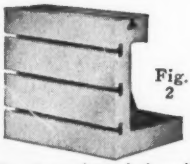


Fig. 2

These Plates are made of semi-steel, heavily ribbed, insuring close-grained, rigid castings.

With Second Face and T Slots

No.	Size Face	Size Top	Size Base	T Slots	Wt., Lbs.	Price, Each
1T	3¾ x 5	1½ x 5	2½ x 5	4–¼"	5	$10.00
2T	6 x 7	2½ x 7	4½ x 7	4–½"	20	15.00
3T	8 x 9	3 x 9	6 x 9	4–½"	38	20.00
4T	10 x12	3½ x12	7¾ x12	4–⅝"	75	30.00
5T	14 x16	4 x16	9 x16	4–⅝"	170	45.00

SHELDON 90o PLAIN ANGLE PLATES

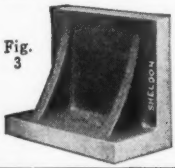


Fig. 3

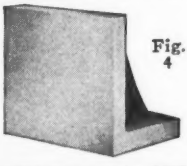


Fig. 4

No.	Size Face	Thickness Face	Size Base	Wt., Lbs.	Price, Each
1P	3¾ x 5	½	2½ x 5	4	$ 8.00
2P	6 x 7	¾	4½ x 7	15	10.00
3P	8 x 9	1	6 x 9	30	14.00
4P	10 x12	1¼	7¾ x12	60	20.00
5P	14 x16	1½	9 x16	145	30.00

Sheldon "Set-Up" Jacks

Fig. 1 Planer Jack

Fig. 2 Vertical Jack

Fig. 3 Bracing Jack

PLANER JACKS (Fig. 1)

No.	Height, Contracted	Height, Extended	Diam., Screw	Weight, Lbs.	Price, Each
1	2¾	3¾	⅞	1½	$1.25
2	3¾	5¼	1⅛	3	2.10
3	5¼	7½	1¼	6	3.00
4	7½	12	1½	12	6.00

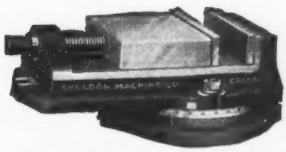
VERTICAL JACKS (Fig. 2)

1	2¾	4	⅝	1½	$ .75
2	4	7½	⅞	2	1.10
3	6¾	12	¾	5½	1.70
4	8¾	15	1	7	2.50

BRACING JACKS (Fig. 3)

1	3¾	6	⅝	1	$ .65
2	4¾	8	⅝	2	1.00
3	6¾	12	¾	3	1.50
4	8¾	16	¾	4	2.10

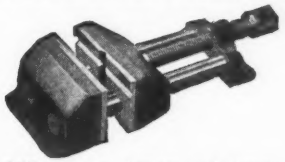
Sheldon Milling Machine Vises



Furnished Both Plain and With Swivel Base.
SPECIFICATIONS AND PRICES:

No.	Width of Jaws	Depth of Jaws	Jaws Open	PLAIN VISE Wt., lbs.	PLAIN VISE Price	SWIVEL VISE Wt., lbs.	SWIVEL VISE Price
3	3½"	1⅝"	2½"	15	$16.00	25	$20.00
4	4½"	1⅝"	3½"	30	$20.00	45	$24.00
6	6½"	2 "	4½"	70	$30.00	90	$40.00
8	8½"	2½"	7 "	160	$45.00	225	$60.00

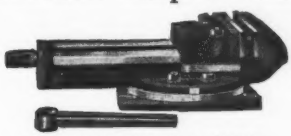
Sheldon Drill Press Vises



Guide Bars are Hardened and Ground.
SPECIFICATIONS AND PRICES:

No.	Width of Jaws	Depth of Jaws over Guide Bars	Full Depth of Jaws	Jaws Open	Wt., lbs.	Price
D 4	4½"	1⅝"	3"	4"	15	$12.00
D 6	6½"	1¾"	3½"	6"	35	$18.00
D 9	9 "	2½"	4½"	9"	70	$24.00

Sheldon Shaper Vises



SPECIFICATIONS AND PRICES:

No.	Size of Jaws	Vise Opens	Bolt Hole Spacing*	Wt., lbs.	Price
1	12" x 2½"	12½"	7½"	175	$120.00
2	14" x 2¾"	13½"	8½"	240	$135.00

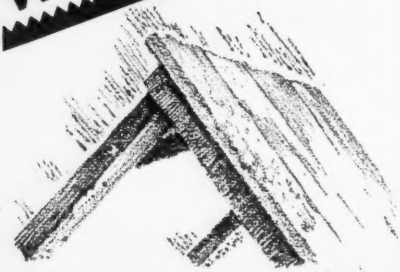
*Distance between holes can be changed without additional charge.

Write for Catalog Describing Full Line of SHELDON Tools For the Machine Shop

SHELDON MACHINE TOOL CO.

3251 Cottage Grove Avenue, CHICAGO, ILL.

OUT GOES THE WORK BENCH



THE advent of the new DAVENPORT UNIVERSAL DIE HOLDING STAND spells the end of a heretofore awkward operation. The cumbersome, space consuming work bench gives way to this new and improved die shop equipment.

The men LIKE Universal Stands. No more juggling of heavy, unwieldly die blocks by hand. Once the die is locked in the Universal Stand no further physical handling is necessary. Possibility of accident is eliminated. All desired positions of the die are achieved instantly by simple adjustments—thus facilitating and speeding the progress of the workman. The stand is fitted with a handy tool box.

Upon request, we shall be glad to send illustrated folder describing the many advantages of this new die shop equipment.

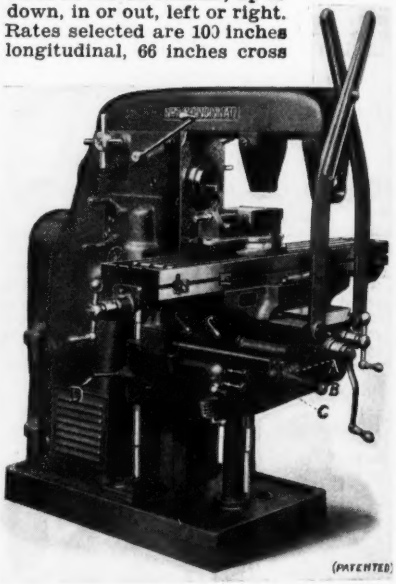
DAVENPORT LOCOMOTIVE & MFG. CORP.
DAVENPORT, IOWA

DAVENPORT
Universal
Die Holding Stand

bearing surface, the worms are hardened, have ground threads, and work with phosphor bronze worm wheels. To provide for long service under high speeds, Ohio Worm-Gear Speed Reducers are equipped throughout with Timken Roller Bearings.

Improvements on Cincinnati M-Type Millers

Cincinnati M-Type Millers, the Nos. 1 and 2 Plain, Universal and Vertical styles manufactured by The Cincinnati Milling Machine Co., Cincinnati, Ohio, are now equipped with power quick traverse in six directions; up or down, in or out, left or right. Rates selected are 100 inches longitudinal, 66 inches cross and 33 inches vertical. The power quick traverse lever which is conveniently located at the left front side of the knee as shown by the illustration has three positions, indicated by "A," "B," and "C." Upward (A), power quick traverse; horizontal (B), neutral; and downward (C), feed. To obtain power quick traverse in a given direction, it is only necessary to engage the respective fed lever, move the reversing lever into position and then pull upward on the power quick traverse lever. This must



Cincinnati M-Type Miller with Improvements

This Screw *cuts its own thread* in sheet metal... Eliminates tapping

ONLY one simple operation to assemble sheet metal with Hardened Self-tapping Sheet Metal Screws. Slow and costly tapping is eliminated. This unique Screw cuts its own thread in the sheet metal—just turn it into a drilled or pierced hole with a screw driver.

With Self-tapping Screws sheet metal assemblies are made rapidly, easily and economically. Elimination of tapping makes an amazing reduction in time and cost . . . banishes trouble with crossed threads . . . allows employment of unskilled workmen for assembly work.

In thousands of plants, where sheet metal products are assembled, these remarkable Screws have replaced machine screws, stove bolts, rivets or welding. What can be better proof of their economy, utility and dependability?

It costs nothing to try Self-tapping Screws on your own work. Just describe your assembly—we will furnish suitable samples.

PARKER-KALON CORP.
192-196 Varick St., New York, N. Y.

PARKER-KALON
HARDENED SELF-TAPPING
Sheet Metal Screws

PATENTED
APR. 3, 1919—No. 1299232 — MAR. 29, 1922—No. 1411184
AUG. 14, 1923—No. 1465148 — FEB. 10, 1925—No. 1526102
OTHERS PENDING

Parker-Kalon Corporation,
192-196 Varick St., New York.
Please send me samples of Hardened Self-tapping Screws. I want to try them out for

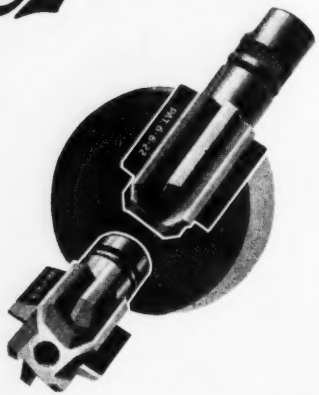
.....

Name.....

Address.....

There's Economy in

Eclipse TOOLING!



ECLIPSE Tools cut cost by eliminating extra operations.

Here is an Eclipse combined Core Drill and Facer which is used to great advantage for machining Welch Plug holes, or for finishing in one operation holes having two or more diameters.

The Eclipse Catalog describes many more methods of economizing with Eclipse high production tools. You'll find it very interesting—send the coupon for your copy.

ECLIPSE COUNTERBORE CO.
DETROIT MICH.

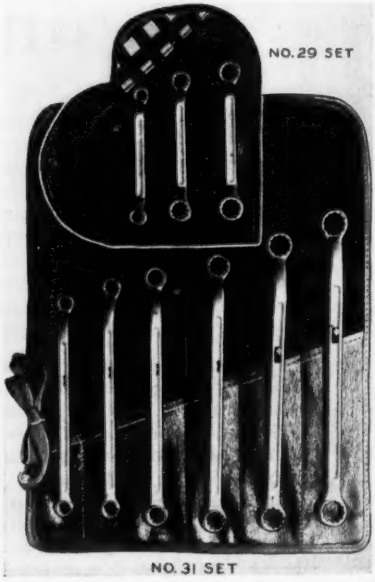
ECLIPSE COUNTERBORE CO.,
Detroit, Mich.
Please send your Catalog No. 28 to
Name .....
Firm .....
Address .....
City..... State.....

be pulled upward and held in position. A valuable safety feature consists in that falling work or wrenches that strike the lever cannot engage it.

Feed in the same direction as the power quick traverse is obtained by moving this same lever into the downward or feed position, in which position it can be locked. Twelve feeds are available; ¾ in. to 30 in. longitudinal, ½ in. to 20 in. cross, and ¼ in. to 10 in. vertical, in both directions. Rear control of any one of the three feeds can also be obtained by the use of the rear reversing lever (D), which duplicates the action of the standard lever located at the front of the feed box.

Bonney Wrench Sets

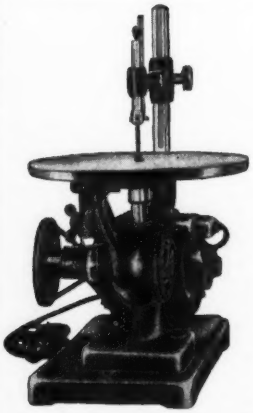
Two new "Chrome Vanadium" wrench sets have been announced by the Bonney Forge & Tool Works, Allentown, Pa. These are the No. 29 Set and



Nos. 29 and 31 Bonney Wrench Sets

the No. 31 Set, shown in the illustration. The No. 29 set consists of the three most popular short-type double hexagon box wrenches. These three double end wrenches will take care of the sizes of nuts and bolts that are

Illinois Die Filing Machine



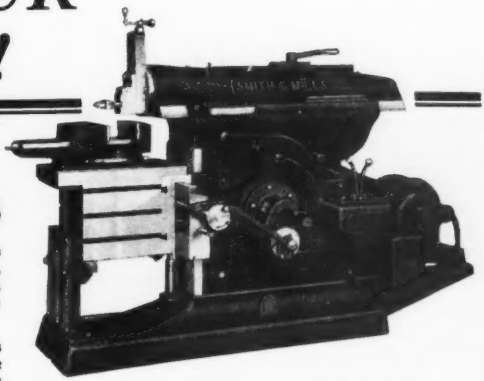
A LIGHT, RIGID, SMOOTHLY OPERATING MACHINE FOR FILING, STONING OR SAWING

FURNISHED WITH OR WITHOUT OVERARM

Descriptive Circular and Prices Upon Request

ILLINOIS TOOL WORKS, CHICAGO
2501 NORTH KELLER AVENUE

CUT YOUR COSTS!



SMITH & MILLS
HIGH SPEED
CRANK SHAPERS

are designed for accurate work at high speeds. They shorten production time, which cuts your operating costs. Smith & Mills shapers are equally efficient on tool room or production work.

Smith & Mills modern improvements include "V" type ram with 55 degree ways, splined shafts, heat-treated alloy steel gears, speed box shafts mounted on Timken tapered roller bearings, Twin Disc Clutch, and one shot lubrication system.

WRITE FOR CATALOG!

Made in 16, 20, 25 and 32-inch sizes back geared; single-geared in 12 and 14-inch stroke.

THE SMITH & MILLS CO., Cincinnati, Ohio

The PULLMORE Industrial Clutch

will do just what its name implies—pull a heavier load more efficiently! Some of the features which make this clutch so efficient are:

COMPACTNESS

which reduces the necessary clutch space to a minimum. Capacity as a basis, the PULLMORE is the smallest clutch made.

ADAPTABILITY

The small compact construction allows the clutch to be applied to practically every clutch requirement. It is built in six sizes (single or double) to operate dry, or in an oil bath.

SEND COUPON!

These features and many other efficiency features are described in the PULLMORE Catalog—send the coupon today for your copy!

Rockford Drilling Machinery Co.

10 Catherine Street

ROCKFORD ILLINOIS

ROCKFORD DRILLING MACHINE CO.
Rockford, Ill.

Send me a copy of the PULLMORE Industrial CLUTCH catalog.

Name .....Title.....

Firm .....

Address .....

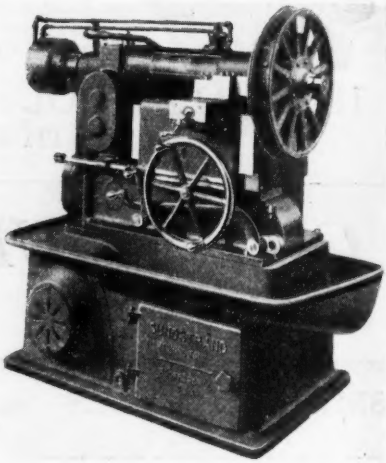
.....

MMS-12

most commonly used. The No. 31 Set consists of six double hexagon double end box wrenches of the regular length, to accommodate the twelve sizes of nuts and bolts most commonly used. The wrenches are broached with twelve corners, making it possible to remove the nuts or bolts even though obstructions will permit only a 1/12 turn at a time.

Sundstrand Brake Drum Stub Lathe

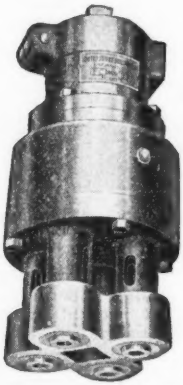
In response to a demand for a simple, easily-operated high production lathe with which brake drums can be turned after they have been attached to the wheels, the Sundstrand Machine Tool Co., Rockford, Ill., has developed the Brake-Drum Stub Lathe shown in



Sundstrand Brake Drum Stub Lathe

the illustration. The machine is similar to the Sundstrand Stub Lathe, the difference being that the bed is shorter, the carriage feed is reversed, and the spindle has been lengthened so that the wheel and drum overhang the right end of the bed. Front and rear tool carriages are provided for roughing and finishing cuts, but the rear slide can be omitted. Unmounted drums can be turned readily. Any desired method can be used for supporting and driving the work, although the usual method is to employ an air-operated work-holding device, which is furnished if desired. The twelve spindle speeds and ten feed

Speed Up
DRILLING OPERATIONS
with a



U.S. Drill Head

WITH this simple attachment on your one-hole-at-a-time drilling machine, you can drill two, six, a dozen, or fifty holes, if necessary, in the same time it takes to drill one.

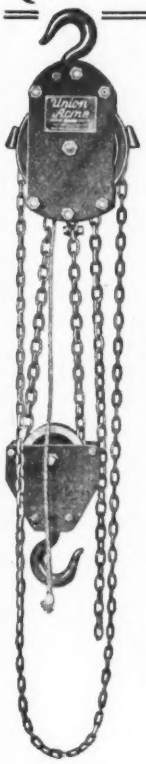
The drill head shown above is a single purpose tool for drilling four holes at one time. It is a fixed spindle multiple head, but we also make adjustable spindle multiple heads, which can be used on a variety of jobs. What is your problem? We will design a U. S. Multiple Drill Head to meet your particular needs. Send us your blue print NOW.

***The* United States Drill Head Co.**

1954 Riverside Drive

CINCINNATI, O., U. S. A.

Quick Returns!



THE outstanding feature of the all-steel constructed UNION Acme Quick-Acting Hoist is the ease with which the hook can be brought to and from the load without overhauling the hand chain. Light loads can be lifted by a direct pull on the slack end of the chain.

This hoist is especially adapted for mill wrights, machine shops or garages and in combination with UNION Trolleys and small I-Beams, can be used very efficiently to serve individual machines. It is built in three sizes . . . ¼, ½ and 1 ton capacities . . . tested to carry 50% overload and guaranteed not to slip while carrying a load. You can order direct or through your nearest dealer.

Write for Union Chuck and Hoist Catalog

UNION MFG. CO.

Manufacturers of Union Chucks and Hoists

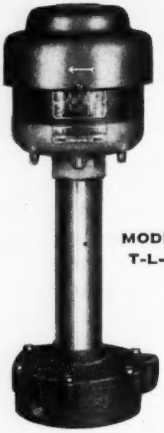
NEW BRITAIN, CONN.

BRANCH OFFICES

27 S. Jefferson Street, Chicago, Ill.
26 Cortlandt Street, New York City
332 Sycamore Street, Cincinnati, O.
661 Folsom Street, San Francisco, Cal.
440 First National Bank Building, Houston, Texas

"GUSHER"
Coolant Pumps

For Every Purpose and Capacity

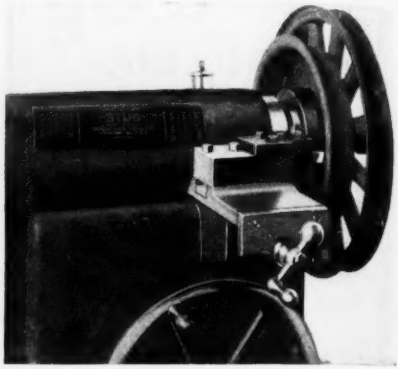


No matter what machine you use—there is a "Gusher" to suit your needs.

Write for Information

The Ruthman Machinery Co.
532 East Front Street
CINCINNATI, O.

changes are secured through pick-off gears. The spindle speeds range from 40 to 265 r.p.m., and the feeds range

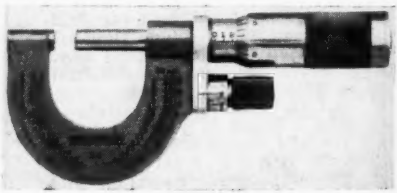


View Showing Tool In Position

from .005 in. to .046 in. The table travel is 8 in. Dimension from floor to center of spindle, 45 in. Floor space required, 60 x 45½. Net weight without motor, 3100 pounds.

Brown & Sharpe Micrometer Caliper No. 24

An entirely new principle in measuring to ten-thousandths of an inch is employed in the Micrometer Caliper No. 24 recently announced by the Brown & Sharpe Mfg. Co., of Providence, R. I. This tool, with a range of from 0 to 1-



B. & S. Micrometer No. 24

inch by ten-thousandths, reads the ten-thousandths parts of an inch direct.

With Micrometer Caliper No. 24 the thousandths are read from the barrel and thimble in the regular manner, and the readings in ten-thousandths of an inch are read directly from the small lower thimble. The widely spaced grad-

For Real Shaper Efficiency

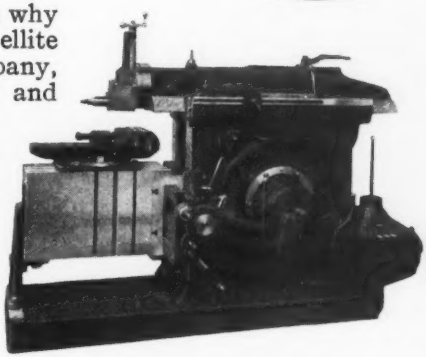
INVESTIGATE

COLUMBIA SHAPERS!

Columbia SUPERIOR

YOU will then readily appreciate why such concerns as the Haynes Stellite Company, General Electric Company, the New York Central Railroad and scores of other companies use these machines in their plants.

They like Columbia Shapers because of their massive, powerful construction, which enables them to stand up under the most severe strain when taking heavy cuts. Many other cost reducing features are incorporated in the design of these tools. Bulletin number 17 tells how these features place real shaper efficiency in your plant—write for it TODAY!

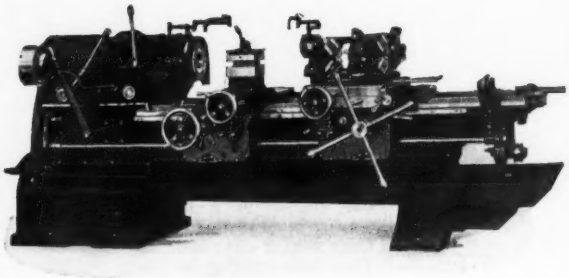


THE COLUMBIA MACHINE TOOL CO.

HAMILTON, OHIO

No. 3 Acme Heavy Type Universal Turret Lathe with DUO CONTROL

Higher operating efficiency, together with simplified design, makes this Acme Turret Lathe an unequalled producer on all work within range.



DUO CONTROL Turret Lathes Built in These Sizes

No. 1 — Semi- and Full Universal, 2½" capacity.

No. 2 — Semi- and Full Universal, 3¼" capacity.

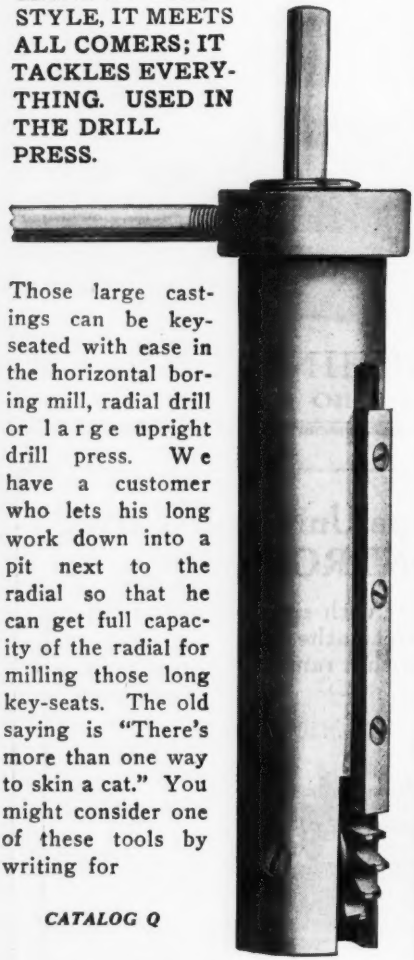
No. 3 — Semi- and Full Universal, 3½" spindle capacity.

17" and 4½" Semi- and Full Universal, 4½" spindle capacity.

THE ACME MACHINE TOOL CO., Cincinnati, Ohio

GIGANTIC KEYSEATER

MADE IN THIS STYLE, IT MEETS ALL COMERS; IT TACKLES EVERYTHING. USED IN THE DRILL PRESS.



Those large castings can be keyseated with ease in the horizontal boring mill, radial drill or large upright drill press. We have a customer who lets his long work down into a pit next to the radial so that he can get full capacity of the radial for milling those long key-seats. The old saying is "There's more than one way to skin a cat." You might consider one of these tools by writing for

CATALOG Q

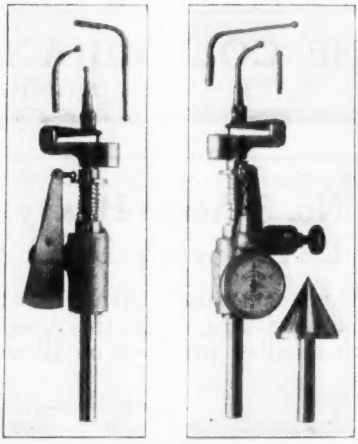
National Machine Tool Co.
2271 Spring Grove Avenue
CINCINNATI, OHIO, U. S. A.

uations permit parts of ten-thousandths to be estimated.

This new micrometer caliper is used and operated in much the same way as the conventional one-inch micrometer. After the spindle has been brought up to the object to be measured, the small lower thimble is revolved until the horizontal line on the barrel of the micrometer coincides with a graduation on the main thimble. The graduation on the small lower thimble then tells the ten-thousandths of an inch to be added to the thousandths reading.

Schwieterman Center Finder

A center finder for use in locating centers for jig-boring and similar work has been placed on the market by A. G. Schwieterman, 109 Illinois Ave., Dayton, Ohio. When finding the center of a piece of work, the spindle of the center finder is rotated with the spindle of



Schwieterman Center Finder

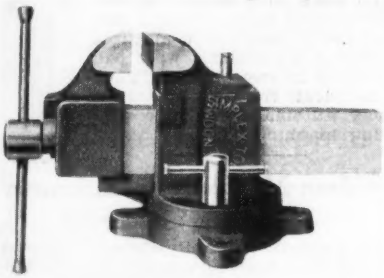
the machine while the test indicator is held stationary. With practice it is said that work can be centered within 0.0002 in. in less than a minute.

In using the center finder for locating the center of a hole, the cone-shaped center is first inserted in the chuck and the center is located approximately. The cone center is then replaced with the center finder, with the feeler finger adjusted to the size of the hole. By holding the indicator as the chuck rotates, any variation in the location of the shank of the center finder will be

apparent on the indicator. Three quick-changeable feeler fingers are available; No. 1, for holes up to ¾-in. diameter; No. 2, for holes ¾ to 1½ in. diameter and for locating buttons, and No. 3, for holes from 1½ to 3 in. diameter.

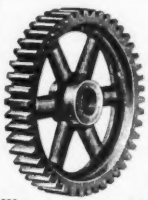
Simplex Swivel Back Jaw Vise

The Simplex Tool Co., Woonsocket, R. I., has brought out a swivel back jaw vise which is so designed that it will hold irregular-shaped work. The back jaw of this vise is made in two parts with the top part arranged so that it swivels, thus making it possible to hold pieces of various shapes. The top part is provided with a pin by which it can be locked when the swivel feature is not desired. Like all Simplex vises, the



Simplex Swivel Back Jaw Vise

sliding member of the front jaw is machined out of a solid bar of steel, thus making this part practically unbreakable at the point where most vise breakage occurs. A special type now makes it impossible to bind the screw, thus eliminating possible trouble and danger of breaking the screw or the nut. The vise is provided with an outside screw



GEARS
In Stock . . . Immediate Delivery
Gears, speed reducers, sprockets, thrust bearings, flexible couplings, pulleys, etc. A complete line is carried in our Chicago stock. Can also quote on special gears of any kind. Send us your blue prints and inquiries.
Write for Catalog 80
CHICAGO GEAR WORKS
769-773 W. Jackson Blvd. Chicago, Ill.

NIELSEN
Live Centers
Stand the "Gaff"

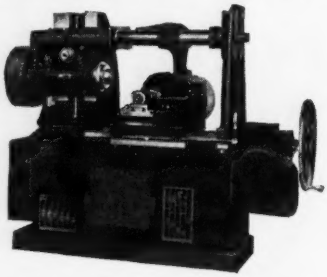
The stamina of NIELSEN Live Centers has been proven in a recent demonstration of tungsten carbide at the Case School of Applied Science.

A standard No. 6 NIELSEN Live Center was placed on a turret lathe equipped with a tungsten carbide cutting tool. A cut ⅝" deep with a feed of .037" per revolution was taken in cast iron at a cutting speed of 500 surface feet per minute. The center stood up under this cutting load without chatter and showed no sign of breaking down or burning.

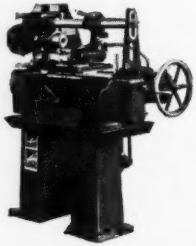
There is a NIELSEN Live Center for every center requirement—write for bulletin.

NIELSEN, Inc.
LAWTON, MICH.

SERVICE *Is Our Motto* QUALITY *Our Creed*



HOBBING MACHINES *by* BARBER-COLMAN *of* ROCKFORD



4 SIZES of Hobbing Machines . . . two sizes "universal" type for spur and spiral gears, sprockets, ratchets, splined shafts and other hobbed forms . . . two sizes for high production on spur gears and splined shafts only . . . Quality Products . . . Send for our circulars.

BARBER-COLMAN COMPANY

General Offices and Plant, *Rockford, Ill., U.S.A.*

retainer and removable jaw inserts which are both doweled and screwed on.

Apex Floating Tap Sleeve

Apex Tap Sleeve

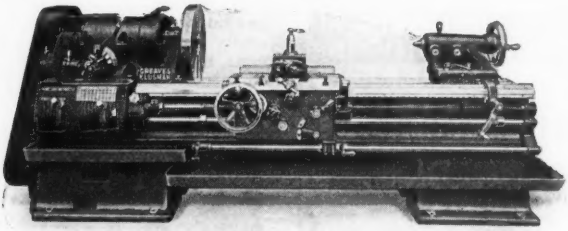
The floating tap sleeve shown in the illustration has been developed by the Apex Machine Company, Dayton, Ohio. The tap is driven by the square and help in the sleeve the same as in all standard Apex tap collets. The bore and square of the sleeve being larger than the tap shank and square, the tap is free to float and follow the hole, thereby correcting for misalignment between tap and work and producing better tapped holes. These are for use in single and multiple tapping operations and can be used in any position. They are ideal for two or three way automatic multiple tapping machines.

Wilson-Maeulen Potentiometer Pyrometer Recorder

A Potentiometer Pyrometer Recorder which has been developed by the Wilson-Maeulen Company, Inc., Concord Avenue at 143rd Street, New York, has a temperature record chart 12 inches wide, together with a number of other new features of mechanical and electrical design. In this recorder, when the measured voltage from the thermocouple changes, as a result of temperature change at the thermocouple, the galvanometer pointer deflects in the corresponding direction. At intervals of 10 seconds a boom descends and grips the pointer firmly while two sensing fingers, moving in a vertical plane, approach the pointer from either side, exploring for the location of the pointer, and if either finger finds the pointer out of its central position, a dog is released which causes a drum to turn. The motion of the drum is transmitted to the carriage, which is adapted to travel back and forth across the whole instrument, and the galvanometer is brought back towards its null or undeflected position. At the same time, the recording pen records on the chart the temperature of the thermocouple.

Among the advantages of this recor-

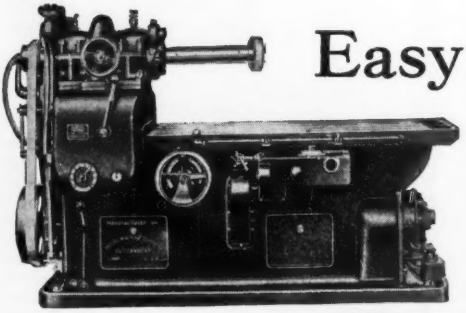
G-K Single Lever Control



SHOP Superintendents and production men specify G. K. Single Lever Control Lathes because any spindle speed of an unusually wide range can be instantly selected through a *single lever.* An index plate simplifies the operation still further—it tells at a glance how to obtain the desired speed.

There are many other features in G. K. lathes that have an important bearing on production costs. They are fully outlined in the G. K. Catalog.

The Greaves-Klusman Tool Co., Cincinnati, Ohio



Easy to Operate

Micro Model "DG," a general utility grinder with slotted table to accommodate work mounting fixtures.

GRINDERS Micro

MICRO INTERNAL GRINDERS are noted for their operating ease. Any competent workman, with brief instruction, is qualified to operate a Micro Grinder and achieve maximum results in speed, economy and precision. All controls located within easy reach of the operator.

MICRO MACHINE COMPANY

Bettendorf — MANUFACTURERS AND DESIGNERS OF *PRECISION GRINDERS* FOR ALL PURPOSES — Iowa, U-S-A

Stuart Oils
FOR THE "TOUGHEST" METAL WORKING CONDITIONS

"A Record Worth Telling the World"

OF the 104 exhibits at the recent National Machine Tool Builders Exposition at Cleveland using cutting or grinding lubricants,

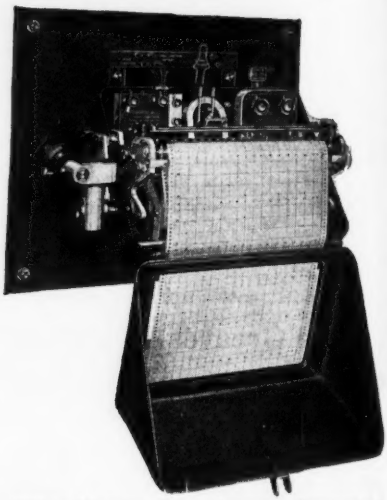
52 OR AN EVEN 50%

USED STUART PRODUCTS

We regard this record as a striking testimonial to the outstanding efficiency of D. A. STUART cutting and grinding lubricants because of the fact that the exhibits selecting STUART products were almost without exception the exhibits intentionally operated under the severest possible conditions in respect to feed, speed and stock.

D.A.STUART & CO. LIMITED
CHICAGO. U.S.A.
Warehouses in Principal Centers

der is a provision for easily adjusting the sprocket at one end of the paper roller, thus permitting adjustment to take care of variations in the width of the paper due to atmospheric conditions. Changes in the temperature of the thermocouple cold junction are automatically compensated for in the instrument by an electric cold junction compensator. Power is furnished by an



Wilson-Maeulen Potentiometer Pyrometer Recorder

external drive unit which consist of an ample sized motor and double worm and gear speed reducing system that is identical with the drive units employed on the other temperature controllers made by this company. A number of recorders can be operated by one drive unit. For temperatures below 600 degrees F., this recorder can be supplied to operate as an electric thermometer employing resistance bulbs.

The instrument case opens diagonally, making the entire mechanism accessible. Heavy and rugged construction is in evidence throughout.

Grinding Information

Cincinnati Grinders, Inc., Cincinnati, Ohio, has issued a booklet which fully describes the No. 3 and No. 4 Cincinnati Centerless Grinders and includes illustrations of these machines in actual

INVENTORY TIME IS COMING!

Inventory time is the time to salvage all those old worn out cutters which you may find. Have them recut by the National Tool Salvage method and save from 20% to 60% on your tool costs.

The teeth are recut and the clearance restored by this method without impairing the quality or temper of the steel. *Each recut tool is guaranteed to be as efficient as a new tool.*

Prove the merit of this method to your own satisfaction. Send us a trial order, and put the reclaimed cutter to any test you desire. We'll pay transportation one way.

National Tool Salvage Co.
3840 BEAUBIEN ST DETROIT MICH

3840 Beaubien St. DETROIT, MICH.

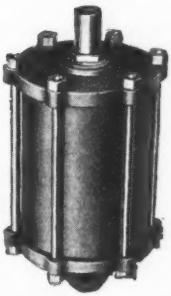
"HOPKINS" PREFERRED EQUIPMENT

Non-Rotating Tubular Type AIR-CYLINDERS!

Why HOPKINS Cylinders?

Operating economies . . . mechanical advantages . . . elimination . . . of production wastes . . . labor-saving: these are a few reasons why HOPKINS Double-Acting AIR CYLINDERS are preferred equipment.

Let our engineering department help you. No obligation.



Style 3

THE TOMKINS-JOHNSON CO.
620 MECHANIC STREET
JACKSON, MICH., U. S. A.

Also Manufacturers of Chucks, Die Sinking Milling Cutters, Work Stands, Special Equipment, Etc.

Sales Representatives:

HABERKORN & WOOD
2208 W. Fort Street, Detroit, Mich.
G. M. PEARSE
1030 Broad Street, Newark, N. J.
H. E. HENRY
1220 W. Sixth Street, Cleveland, O.
JENKINS & CHAFFEE
318 N. Clinton St., Syracuse, N. Y.

COUPON

THE TOMKINS-JOHNSON CO.
JACKSON, MICH.

☐ Send Representative
☐ Send Cylinder Circular

Name.....
Address.....
City..... State.....

operation on a variety of jobs. This company has also issued a bulletin which features Automatic Hoppers for Cincinnati Centerless Grinders, describing and illustrating the use of the automatic hopper for feeding work of the thru-feed, in-feed and end-feed classes into the machine. Either of these pieces of literature can be obtained by addressing the company.

PRECISION
. . MEASURING INSTRUMENTS

WHEN you own a Swedish Gage Micrometer Model AA you have the most accurate mike made—accurate within .000075". Write for booklet telling about our micrometers, snap gages and inside indicator gages.

MADE IN ESKILSTUNA
THE HOME OF ACCURACY
SWEDISH GAGE CO. OF AMERICA
7310 WOODWARD AVE., DETROIT, MICH.

Norton Booklet on "Grinding Wheel Selection"

The Norton Company, Worcester, Mass., has issued a revised edition of the booklet "Factors Affecting Grinding Wheel Selection." All the various factors affecting the selection of the wheel are discussed, including material to be ground, amount of material to be removed, size of work, type of machine used, and so on. The proper wheel and work speeds are also covered in detail and a table covering several pages is included, listing materials to be ground and specifying the wheel to be used for each. Copy free to any mechanical executive.

Useful Tool Information

The Illinois Tool Works, 2503 N. Keeler Ave., Chicago, Ill., has published "Catalog D," which not only describes and illustrates the standard and special cutters, mills, hobs, gear cutters, thread cutters, saws, reamers and other tools made by this firm, but also contains a number of tables of useful information. Copy free to any mechanical executive.

Erratum

The Cincinnati No. 30 Knee and Column Type Miller which was described in the November issue of MODERN MACHINE SHOP should have been designated as the No. 3.

By mentioning MODERN MACHINE SHOP when writing to our advertisers, you are helping to build up a bigger and better magazine for your own benefit.

BE SURE—

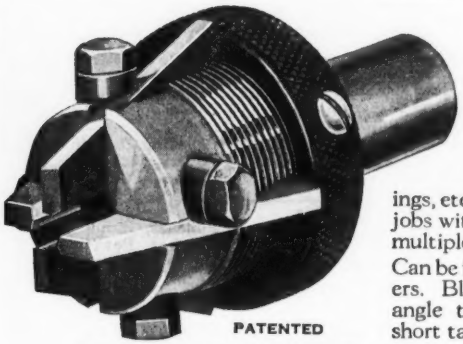
No. O-1-2 Desmond Huntington Dressers

every grinding wheel in your shop has a keen cutting edge—always true and sharp! The Desmond-Huntington Dressers are very efficient on wheels where quick action is necessary. *Write for Catalog M.*

The DESMOND-STEPHAN MFG. CO., URBANA, OHIO

Genesee Adjustable Hollow Mill

Made in 7 different styles



PATENTED

Has adjustable, replaceable blades and can be replaced at nominal cost, making it unnecessary to continually buy new tools.

The ideal tool for finishing your forgings, castings, etc. Do your several operation jobs with Genesee inserted blades multiple operation tools.

Can be fitted with drills and reamers. Blades can be ground any angle to point work and turn short tapers.

A Genesee Adjustable Hollow Mill can be made for every job

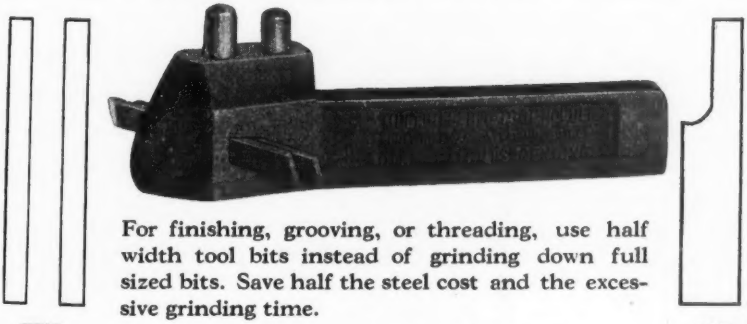
WRITE FOR CATALOGUE

GENESEE MANUFACTURING CO., Inc.

ROCHESTER, NEW YORK

WEDGE-LOCK MULTIPLE BIT

TOOL HOLDERS SAVE TIME



TWO TOOLS

ONE TOOL

For finishing, grooving, or threading, use half width tool bits instead of grinding down full sized bits. Save half the steel cost and the excessive grinding time.

ASK YOUR JOBBER OR ADDRESS

WEDGE-LOCK TOOL COMPANY

2521 No. KEELER AVENUE CHICAGO, ILLINOIS

Check For Information Wanted

If you are interested in prices or information on any of the equipment listed, check the item, write your name, firm name, title and address on the margin, tear out the page and send it to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. We will see that you are supplied with the information desired.

- ☐ Abrasive Discs
- ☐ Abrasive Polishing Grains
- ☐ Arbors
- ☐ Babbitt Metal
- ☐ Balancing Machines
- ☐ Balancing Ways
- ☐ Bearings, Ball or Roller
- ☐ Bearings, Die-cast
- ☐ Bearings, Bronze & Bab't
- ☐ Belting, Leather
- ☐ Belt Dressing
- ☐ Bench Legs
- ☐ Benches
- ☐ Bending Machines
- ☐ Blue Printing Machinery
- ☐ Bolt and Nut Machinery
- ☐ Bolts and Nuts
- ☐ Bolts, Stripper
- ☐ Boring Bars
- ☐ Boring Mills, Vertical
- ☐ Boring Mills, Horizontal
- ☐ Boring Heads
- ☐ Boring Tools
- ☐ Broaches
- ☐ Broaching Machines
- ☐ Bushings, Jig
- ☐ Bushings, Bearing
- ☐ Cabinets, Steel, Shop
- ☐ Calipers
- ☐ Centering Machines
- ☐ Centers, Lathe
- ☐ Chains, Sprocket
- ☐ Chamfering Machines
- ☐ Chucking Machines
- ☐ Chucks, Air-Operated
- ☐ Chucks Quick-Changing
- ☐ Chucks, Collet
- ☐ Chucks, Drill and Tap
- ☐ Chucks, Lathe and Planer
- ☐ Clamps, Machinists'
- ☐ Clutches, Friction
- ☐ Collars, Spacing
- ☐ Compounds, Carbonizing
- ☐ Compounds, Cutting
- ☐ Compressors, Air and Gas
- ☐ Contract Work
- ☐ Counterbores
- ☐ Countersinks
- ☐ Couplings, Flexible
- ☐ Cutters, Gear
- ☐ Cutters, Keyseating
- ☐ Cutters, Milling
- ☐ Cutting-Off Machines
- ☐ Cutting-Off Tools
- ☐ Dies, Self-Opening
- ☐ Dies, Threading
- ☐ Die Sets
- ☐ Die Shoes
- ☐ Dividing Heads
- ☐ Dogs, Lathe
- ☐ Dowel Pins
- ☐ Dressers, Grinding Wheel
- ☐ Drill Holders
- ☐ Drilling Machines, Bench
- ☐ Drilling Machines, Sensitive
- ☐ Drilling Machine Heads
- ☐ Drilling Mach., Automatic
- ☐ Drilling Machines, Gang
- ☐ Drilling Mach., Heavy Duty
- ☐ Drilling Machines, Multiple
- ☐ Drilling Machines, Radial
- ☐ Drills, Center
- ☐ Drills, Portable Electric
- ☐ Drills, Portable Pneumatic
- ☐ Drills, Ratchet
- ☐ Drills, Twist and Flat
- ☐ Files and Rasps
- ☐ Filing Machines
- ☐ Forging Machinery
- ☐ Furnaces, Forging
- ☐ Furnaces, Heat Treating
- ☐ Furniture, Machine Shop
- ☐ Gauge Blocks
- ☐ Gauges, Dial
- ☐ Gauges, Plug and Ring
- ☐ Gauges, Thread
- ☐ Gear Blanks, Composition
- ☐ Gear-Cutting Machinery
- ☐ Gears, Cast or Cut
- ☐ Grinding Mach., Cylindrical
- ☐ Grinding Machines, Univ.
- ☐ Grinding Machines, Cutter
- ☐ Grinding Machines, Drill
- ☐ Grinding Machines, Internal
- ☐ Grinding Machines, Portable
- ☐ Grinding Machines, Surface
- ☐ Grinding Wheels
- ☐ Grinding Wheel Stands
- ☐ Hammers, Pneumatic
- ☐ Hobbing Machines
- ☐ Hobs, Gear
- ☐ Hoists, Chain or Electric
- ☐ Indicators, Speed or Test
- ☐ Jacks, Planer
- ☐ Keyseating Machinery
- ☐ Lapping Machines
- ☐ Lathes, Engine
- ☐ Lathes, Turret
- ☐ Lathes, Automatic
- ☐ Lathes, Bench
- ☐ Lathes, Gap
- ☐ Lathes, Polishing
- ☐ Lathe Dogs
- ☐ Lubricants
- ☐ Mandrels, Expanding
- ☐ Mandrels, Solid
- ☐ Micrometers
- ☐ Milling Machines, Automatic
- ☐ Milling Machines, Bench
- ☐ Milling Machines, Horizontal
- ☐ Milling Machines, Vertical
- ☐ Milling Attachments
- ☐ Milling Tools
- ☐ Oil-Grooving Machines
- ☐ Oil Stones
- ☐ Oils
- ☐ Ovens, Industrial
- ☐ Parallels
- ☐ Pipe-Cut'g & Th'd'g Mach'y
- ☐ Pipe Tools
- ☐ Planers
- ☐ Polishing & Buffing Machs.
- ☐ Presses, Arbor
- ☐ Presses, Punch
- ☐ Pulleys, Metal or Wood
- ☐ Pumps, Lubricant or Oil
- ☐ Punches, Hand
- ☐ Punches, Power
- ☐ Punch Holders
- ☐ Racks, Cut
- ☐ Reamer Holders
- ☐ Reamers, Adjustable
- ☐ Reamers, Solid
- ☐ Riveting Machines
- ☐ Rules, Steel and Wood
- ☐ Rust Preventatives
- ☐ Saws, Metal
- ☐ Saw Frames and Blades
- ☐ Sawing Machines, Power
- ☐ Saws, Band
- ☐ Saws, Milling
- ☐ Scales, Machinists'
- ☐ Screw Machines, Automatic
- ☐ Screw Machines, Hand
- ☐ Screws, Cap, Set or Mach.
- ☐ Shafting
- ☐ Shafts, Flexible
- ☐ Shapers
- ☐ Shears, Hand or Power
- ☐ Sleeves, Drill
- ☐ Springs, Pressure Pad
- ☐ Squares
- ☐ Stamps, Steel
- ☐ Stands, Shop, Portable
- ☐ Tap Holders
- ☐ Tapes, Measuring
- ☐ Tapping Machines
- ☐ Tapping Attachments
- ☐ Taps and Dies
- ☐ Taps, Collapsible
- ☐ Testing Mach'y, Hardness
- ☐ Thread-Cutting Tools
- ☐ Threading Machines
- ☐ Thread Mill. & Roll. Mach'y
- ☐ Tool Bits
- ☐ Tool Cases
- ☐ Tool Holders
- ☐ Tool Posts, Lathe
- ☐ Trolleys and Tramways
- ☐ Trucks, Hand, Lift, Power
- ☐ Turrets, Tool Post
- ☐ Valves, Air Control
- ☐ Vises, Bench or Machine
- ☐ Welding Equip. & Supplies
- ☐ Welding Machines, Electric
- ☐ Wrenches, Drop-Forged
- ☐ Wrenches, Pipe
- ☐ Wrenches, Ratchet
- ☐ Wrenches, Tap

TAPPING?

Balanced Reverse
Fool-proof Safety Friction
Positive Tap Holder
All Hardened Gears

No. 1—Safety Tapper 7/32-in. steel--$28.00
No. 2—Safety Tapper 7/16-in. steel-- 34.00
No. 3—Safety Tapper 5/8-in. steel-- 40.00
No. 4—Safety Tapper 7/8-in. steel-- 52.00

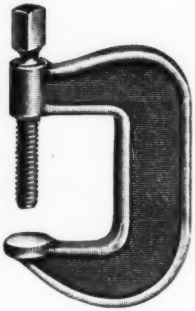
With the "Procunier" Safety Friction Device blind holes can be tapped just as easily as through holes, and without danger of breakage.

Don't Hesitate To Ask For a Free Trial

Catalogue 102-C gives complete details of "PROCUNIER" Tapping Devices, Quick Change Chucks, Stud Setters and Bench Tapping Machines.

PROCUNIER SAFETY CHUCK CO.
12 So. Clinton St. Chicago, Ill.

Boiler Clamps



Drop Forged

Made in seven sizes openings from 4 to 13 inches.

Send for catalogue No. 80, showing Other Types and Lathe Dogs, and Expanding Mandrels, etc.

W. G. LECOUNT TOOL WORKS
SOUTH NORWALK, CONN.

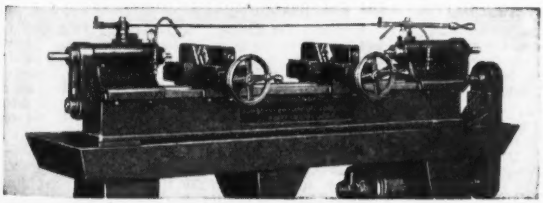
MONARCH
Stud Drivers

displace the present slow and wasteful method of driving studs. It fits snugly over the threads of the stud and you can drive the stud as tight as necessary.

Send for one on fifteen days' trial. You'll find it as necessary as a wrench.

No. Size of Shank	Diameter of Stud	Price Less Disc.
No. 1	0"-3/8"	$ 7.00
No. 2	7/16"-5/8"	8.50
No. 3	11/16"-15/16"	10.00
No. 4	1"-1¼"	14.00

MONARCH TOOL & MFG. CO.
2704 East Larned St. Detroit, Mich.



Sundstrand
Double End Centering Machine

For centering both ends of a shaft simultaneously. Spindles operate together or independently. L. H. head is removable for long shafts. Accommodates a wide variety of work. Special fixtures furnished when desired. Send for Bulletin.

SUNDSTRAND MACHINE TOOL CO. **Rockford, Illinois**

For Your Catalog Library

Check any of these useful publications that you want, write your name, firm name, title, and address on the margin, then tear out the page and send to Modern Machine Shop, 128 Opera Place, Cincinnati, Ohio. They will be forwarded to you promptly without cost or obligation. Please restrict your list to not more than ten.

Abrasive Grinding Wheels: The types of wheels, with recommended grades and grains, which should be used for each of the various kinds of grinds are discussed in a booklet which will be sent free to mechanical executives by the Abrasive Company, Philadelphia, Pa.

Broaching By Modern Methods: Equipment and tools for finishing round, square or irregular-shaped holes and surfaces by broaching are described and illustrated in a booklet that is issued free by the American Broach & Machine Co., Ann Arbor, Michigan.

Ames Dial Gages: The latest types of dial gages for inspection purposes are described in the Ames No. 55 Bulletin, which will be sent free to any machine shop executive. Address B. C. Ames Co., Waltham, Mass.

Scraping By Power: Bearing surfaces can now be scraped with a power scraper that is quicker and easier than the old-fashioned hand method. The tool is described in a folder that is issued by Anderson Bros. Mfg. Co., 1926 Kishwaukee St., Rockford, Ill. Sent free on request.

Steel Furniture for the Shop: The complete line of steel furniture made by the Angle Steel Stool Co., Plainwell, Michigan, including steel stools and chairs, steel foremen's desks, lockers, tables, tool stands, machine tenders, shop boxes and pans, iron bar racks, trucks, bench legs, and bench drawers, is described and illustrated in Catalog "C," which is issued free to machine shop executives.

Stop Tap Breakage: A booklet that tells how to stop the breakage of taps, reamers, and other tools, by the use of a friction chuck, also how to use the chuck for setting studs or nuts, has been issued by The Apex Machine Co., 200 Davis Ave., Dayton, Ohio. Sent free upon request.

Machine Shop Accessories: Catalog B-27, issued by the Armstrong Bros. Tool Co., 328 N. Francisco Ave., Chicago, Ill., describes the line of tool holders, boring tools, wrenches, pipe tools, ratchet drills, lathe dogs, and other tools manufactured by this company.

Hobs and Milling Cutters: A complete line of milling cutters and hobs for cutting all kinds of gears, splines, sprockets and other forms is described in Catalog G, issued by the Barber-Colman Company, Rockford, Ill. Descriptions and illustrations of the Barber-Colman hobbing machine and hob-sharpening machines are included. Sent free on request.

All-Geared Drilling and Tapping Machines: A catalog describing in detail the various types of all-geared, self-oiling, drilling and tapping machines made by the Barnes Drill Co., 801-851 Chestnut Street, Rockford, Ill., will be sent free upon request.

Modern Drilling Equipment: Circulars describing the various types and sizes of Barnes upright drills, multiple drills and horizontal drilling machines made by this company have been issued by the W. F. & John Barnes Co., Rockford, Ill.

Automatic Oiled Die Sets: The automatic oiled die sets, die shoes, punch holders, leader pins, bolster plates, bushings, and other standard die parts made by the E. A. Baumbach Manfg. Co., 1806 S. Kilbourn Ave., Chicago, Ill., are described in Catalog No. 5, which has been issued by that company. Sent free upon request.

"C-V" Chrome Vanadium Wrenches: A complete line of wrenches made of Chrome Vanadium steel—practically unbreakable—is described in a booklet that has been issued by the Bonney Forge & Tool Works, Allentown, Pa. Copy free upon request.

Bradford Precision Lathes: Precision Lathes for the tool room and for general manufacturing purposes, all-geared and cone types, belt or motor driven, are described and illustrated in a catalog that is issued by The Bradford Machine Tool Co., 657-671 Evans St., Cincinnati, Ohio. The catalog also includes descriptions of taper, relieving, turret and other lathe attachments. Sent free upon request.

How to Sharpen Cutters: A series of leaflets, which describe and illustrate the correct methods to employ in sharpening all kinds of cutters, can be obtained, without charge, by addressing Brown & Sharpe Mfg. Co., Providence, R. I.

High Speed Drill Presses: A complete line of drill presses that can be run at high speeds with complete safety is described in catalog number 50, issued by the Canedy-Otto Manufacturing Company, Chicago Heights, Ill. This catalog also contains descriptions of other equipment manufactured by this concern. Sent free upon request.

Gears Of All Kinds are described and illustrated, with specifications, in Catalog 80, which has been issued by the Chicago Gear Works, 105-9 S. Jefferson St., Chicago, Ill.

Gear Data: The Cincinnati Gear Co., Cincinnati, Ohio, has published Catalog D, which describes and illustrates the various types and kinds of gears made by this firm. The book contains photographs of the plant departments, with descriptions of the equipment employed, and also includes a number of pages of valuable data and reference tables for machine shop use.

Grinding the Centerless Way: The advantages of the centerless grinding method is discussed in a booklet which also describes the centerless grinding machines made by Cincinnati Grinders, Inc., Cincinnati, Ohio. The illustrations show various types of jobs in process, and full data is included. Copy free upon request.

Giant Automatics with Hydromatic Feed is the title of a book that describes in detail the new type of automatic milling machine with hydraulic feed, which has been developed by The Cincinnati Milling Machine Co., Oakley, Cincinnati, Ohio. Copy free to any machine shop executive upon request.

Rapid Traverse Planers: Cincinnati Hypro Planers, made by the Cincinnati Planer Co., Cincinnati, Ohio, are described in a new catalog that has been issued by this company.

A Treatise on Shaper Design, illustrating the features that are to be found in the new Cincinnati Rapid Traverse Shapers and describing the shapers that are made by this firm, will be sent free to any mechanical executive by the Cincinnati Shaper Co., Dept. MM, Cincinnati, Ohio.

Bolender Gear Burnisher: The latest methods of burnishing gears for accuracy and silence are described in a booklet that has been issued by the City Machine & Tool Works, 5 N. June St., Dayton, Ohio. Copy free upon request.

Handbook For Drillers: The Cleveland Twist Drill Co., 1242 E. Forty-ninth St., Cleveland, Ohio, has published a book in which the various parts of the twist drill are described, and which tells how to grind a drill correctly. The troubles that result from incorrect grinding are described and illustrated and several chapters are devoted to the subjects of speeds, feeds, materials, cutting compounds, and so on. Sent free upon request.

Columbia Superior Shapers: Bulletin No. 17, issued by The Columbia Machine Tool Co., Hamilton, Ohio, describes and illustrates the line of heavy duty shapers made by this firm. Copy free upon request.

Die Makers' Supplies: A complete line of die sets, leader pins, bushings, and other die makers' supplies

BROACH *for Accuracy—Economy!*

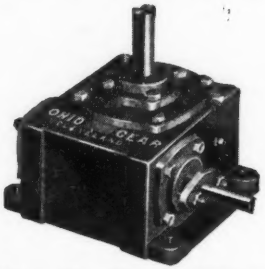
Let us show you how to finish more holes—more accurately—and at less cost.

The American 2-Ton Hydraulic Press

is recommended for broaching connecting rods and work that comes within the 2-ton range. We manufacture presses from 2 tons to 150 tons pressure, also all types of broaching tools.

AMERICAN BROACH & MACHINE CO.
ANN ARBOR, MICHIGAN

SPEED REDUCERS

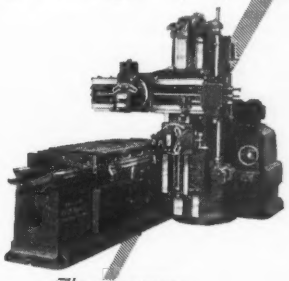


Ratios Up To 24,000 to 1

Send for Catalog 29-A

The Ohio Gear Co.
1335 East 179th St., Cleveland, O.
Pittsburgh Indianapolis
New York

NEW



The **ROCKFORD HY-DRAULIC** *Shaper Planer*

All-Hydraulic!

THE successful application of hydraulic pressure in the powerful table drive of this tool provides speedy operation, exact adjustment to *any* cutting speed between maximum and minimum, finger-tip control and a return ratio of 3 to 1. The feed mechanism has hydraulic drive also—making this Shaper-Planer more than ever unique among high-production machine tools.

The hydraulic features and other advantages are described in the folder illustrated above which is already in its second printing—Send for your copy today.

ROCKFORD MACHINE TOOL COMPANY
2414 Kishwaukee St.
ROCKFORD, ILLINOIS, U.S.A.

are described in a book that is issued by the Danly Machine Specialties, Inc., 2104 South 52nd Avenue, Chicago, Ill. Sent free upon request.

Make Better Dies: Better work can be produced, and in less time, if the die can be held in the most convenient position. A universal die-holding stand which can be quickly adjusted to hold a die at any height or angle is described in a catalog which can be obtained by addressing Davenport Locomotive & Mfg. Corpn., Dept. M, Davenport, Iowa.

Davis Keyseaters: Recent developments in keyseating methods are discussed in a bulletin that also describes the keyseaters made by the Davis Keyseater Company, 250 Mill St., Rochester, N. Y. Copy free upon request.

Grinding Wheel Dressers: All of the different types of grinding wheel dressers made by the Desmond-Stephan Mfg. Co., Urbana, Ohio, including Desmond-Huntington, Desmond-Sherman, Zig-Zag, Diamo-Carbo, and diamond dressers, are described and illustrated in a catalog that has been published by the firm mentioned. Free upon request.

Quantity Drilling: A semi-automatic multiple spindle drilling machine which is designed to produce the maximum of drilled holes in medium or small parts, is described in a pamphlet that is published by the Detroit Machine Tool Co., 5055 Woodward Ave., Detroit, Michigan. Sent free upon request.

Interchangeable High Production Tools: Catalog No. 28, issued free by the Eclipse Interchangeable Counterbore Co., 7410 St. Aubin St., Detroit, Michigan, describes and illustrates the interchangeable counterbores, spot facers, end form cutters, and other end cutting tools made by this firm.

Precision Measuring Instruments: The latest types and models of dial indicators, thread lead test gages, pitch gages, thickness gages, dial comparators, and other precision measuring instruments marketed by the Federal Products Corporation, Providence, R. I., are described and illustrated in a book that will be sent free upon application to this firm.

Silent, Self-Lubricating Gears for use in all kinds of machines are described in a booklet that can be had upon application to Fibroc Insulation Company, Valparaiso, Indiana.

Formica Silent Composition Gears: A booklet telling about the uses and advantages of Formica Silent Shock Absorbing Gears, and containing a considerable amount of valuable data with rules and tables for laying out, cutting and using gears. Sent free by Formica Insulation Co., 4632 Spring Grove Avenue, Cincinnati, Ohio.

Fosdick Drills: This publication gives details as to the design and construction of Fosdick Radial, Upright, and Sensitive Drills. Published by the Fosdick Machine Tool Co., Cincinnati, Ohio.

"Non-Clog" Coolant Pumps are described and illustrated in a booklet which has been issued by the Fulflo Specialties Co., Blanchester, Ohio. Copy free upon request.

The Standard and Special Tools made by the Gairing Tool Co., 1631 Lafayette Blvd., Detroit, Mich., are described and illustrated in a catalog which will be sent free to any mechanical executive. The descriptions cover Gairing counterbores and countersinks, grinding fixtures, reamer-holders, pilots, reamers, spotfacers, and other tools.

Modern Grinding Equipment: The complete line of universal tool and cutter grinders, surface grinders, drill grinders, tap grinders, and other grinding machines made by the Gallmeyer & Livingston Co., 336 Straight St., S. W., Grand Rapids, Michigan, is described in a series of bulletins that have been issued by this firm. Free upon request.

Adjustable Blade Cutters: Hollow mills, facing tools, face mills, milling cutters and other production tools with adjustable, interchangeable blades are described and illustrated in a booklet that is issued free by the Genesee Manufacturing Co., 141 N. Water St., Rochester, N. Y.

1500 Good Tools: The 1500 tools of various kinds that are made by the Goodell-Pratt Company, Greenfield, Mass., are described and illustrated in a Tool Handbook that has been issued by this firm. Copy free upon request.

Greaves-Klusman Lathes: A book containing complete descriptions of the latest types of lathes made by this firm has been issued by the Greaves-Klusman Tool Co., Oakley, Cincinnati, Ohio.

Drilling and Grinding Electrically: Catalog M, showing and describing a variety of modern electric portable drills, grinders, and other tools, including floor grinders and buffers, has been issued by The Hisey-Wolf Machine Co., Colerain and Marshall Sts., Cincinnati, Ohio.

Internal Grinding Equipment: The latest equipment for grinding holes of all sizes, from small wrist pin holes to the holes in locomotive cylinders, is described and illustrated in a booklet that will be sent free by the Hutto Engineering Co., Inc., 542 Lycaste Ave., Detroit, Michigan.

Useful Tool Information: The Illinois Tool Works, 2503 N. Keeler Ave., Chicago, has published a catalog which describes and illustrates the standard and special cutters, mills, hobs, gear cutters, thread cutters, saws, reamers, and other tools made by this firm. The book also contains a number of useful tables and formulas. Copy free upon request.

"Excel" Precision Filing and Sawing Machine: A filing and sawing machine for use in producing templets, dies and other irregular-shaped parts is described and illustrated in a booklet which is issued free by the Index Machinery Corporation, 49 Central Ave., Cincinnati, Ohio.

Special Mil-Waukee-Mils of Standard Units: A milling machine of which the base, heads, columns, and other parts are built in standard units, thus enabling the user to order a machine that will be especially adapted for his job, is described and illustrated in Catalog No. 36, issued by the Kearney & Trecker Corporation, Milwaukee, Wis. Free to machine shop executives.

Cutter and Tool Grinding: A book that tells how to grind tools and cutters accurately and which also describes and illustrates the different types of LeBlond Universal Tool Room Grinders will be sent free upon request. Address, The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio.

Lathe Dogs and C Clamps are described and illustrated in Catalog No. 80, issued by the W. G. LeCount Tool Works, South Norwalk, Conn. Copy free upon request.

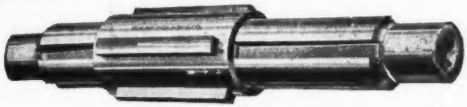
Air-Operated Work-Holding Devices: A booklet showing how air-operated chucks and devices of various kinds can be applied to different kinds of machines to save time and labor has been issued by The Logansport Machine Co., Logansport, Ind.

Punching and Shearing Operations: A complete line of machines for perforating and cutting metal in practically any size and shape is described and illustrated in a booklet which has been issued by The Long & Allstatter Co., Hamilton, Ohio. Copy free upon request.

Rapid-Reading Micrometer: A new type of rapid-reading micrometer, designed to show the reading in numerals, is described in Catalog No. 5, issued by The Lufkin Rule Co., Saginaw, Michigan. The catalog also contains descriptions of the micrometers, calipers, gauges, scales, squares, bevel protractors, and other tools made by this company. Free upon request.

Time Saving Machine Equipment: How machining time can be reduced to the minimum by the use of Wizard chucks, collets and tap holders, turret tool posts, self-centering steadyrests, and other McCrosky equipment is told in a book that is issued by the McCrosky Tool Corporation, Meadville, Penna. Will be sent without charge.

Internal Grinding: The latest methods of grinding internal surfaces with speed and precision are described and illustrated in literature issued by the Micro Machine Company, Bettendorf, Iowa, builders of Micro Grinders. Copies free upon request.



Nicholson
Expanding Mandrels

Machine Shops can get along without tools like expanding mandrels and high speed drills, but they get out work much faster with them.

Write Us About Mandrels

W. H. Nicholson & Co., 136 Oregon St., Wilkes-Barre, Pa.

IT PAYS TO BUY THE BEST

Strand

¼ H. P. Type M 5

FLEXIBLE SHAFTS AND MACHINES

For
Grinding
Polishing
Sanding
Rotary Filing
Drilling
Nut Setting
Screw Driving
Wood Filler
Rubbing, Etc.

⅛ to 2 H. P.

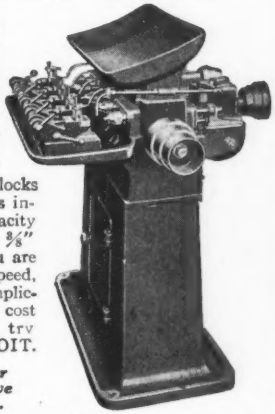
WRITE FOR GENERAL CATALOG

Manufactured by

N. A. STRAND & CO.
5001 North Lincoln St. CHICAGO, ILL.

DETROIT SEMI-AUTOMATIC
DRILLING MACHINE

Thisefficient production machine will drillthework asfast as the operator can load the fixtures. A pull of the lever locks or unlocks the fixtures instantly. Capacity No. 60 to ⅜" drills. If you are looking for speed, accuracy, simplicity and low cost operation, try the DETROIT.



Write for descriptive circular.

DETROIT MACHINE TOOL CO.
5055 Woodward Ave., Detroit, Mich.

FEDERAL DIAL INDICATORS

Comparators
Amplifying Gauges
Thickness Gauges
Depth Gauges
Thread Lead Gauges
Pitch Diameter Gauges
Cylinder Gauges
Paper Gauges
Fabric Gauges
Rubber Gauges
Tap Comparator Gauges
Gear Tooth Comparators
Cutter Testing Gauges
Internal and External Grinding Gauges

Federal Products Corporation, Providence, R. I.
Western Branch: 7338 WOODWARD AVE., DETROIT, MICH.

Hi-Production Counterbores: A counterbore of simple yet highly efficient construction, with positive drive, rigidity, and a number of other features is described in a circular which will be sent free upon request. Address Morse Counterbore & Tool Co., 12281 Turner Ave., Detroit, Mich.

Monarch Stud Drivers: A stud driver that will set a stud tightly and then release easily is described in a circular that will be sent free upon request to Monarch Tool & Mfg. Co., 2704 E. Larned St., Detroit, Mich.

Natco Drilling, Tapping, and Boring Equipment is the title of a publication that has been issued by The National Automatic Tool Co., Richmond, Ind. The book gives details as to construction and uses of "Natco" multiple drilling and tapping machines.

Milling Internal Keyways: A simple method of milling keyways in gears, wheel hubs, and other similar parts with the aid of a drill press and a special tool is explained in a booklet that is published by the National Machine Tool Co., 2271 Spring Grove Ave., Cincinnati, Ohio.

Double Your Cutter Service: Milling cutters, reamers, and other tools can be recut at a saving of from 20 to 60 per cent by the National Tool Salvage Co., 3840 Beaubien St., Detroit, Mich. Circular upon request.

Save Time with Expanding Mandrels: How expanding mandrels will solve the problem of turning pieces with odd-size holes, and will increase production on duplicate work, is told in a folder that will be sent free upon request by W. H. Nicholson & Son, 136 Oregon St., Wilkes-Barre, Pa.

Live Centers: The complete line of live centers manufactured by Nielsen, Inc., of Lawton, Mich., are fully described in a bulletin issued by this company. This bulletin is illustrated with photographs and blueprints of the Nielsen Center. Mailed free upon request.

Ball and Roller Bearing Data Sheets: A complete set of data sheets showing all the dimensions and loads at given speeds, and giving instructions for mounting precision ball bearing and Hoffmann roller bearings, can be obtained without charge by addressing the Norma-Hoffmann Bearings Corporation, Stamford, Conn.

Grinding Wheel Information: A booklet which tells how grinding wheels are made and graded, and which give instructions for mounting wheels, operating speeds for different kinds of work, instructions for truing and dressing, and other information has been issued by the Norton Company, Worcester, Mass. Sent free upon request.

Speed Reducers: Speed Reducers to obtain any desired reduction up to 24,000 to 1 are described and illustrated in Catalog 29-A, issued by The Ohio Gear Co., 1335 East 179th St., Cleveland, O. Copy free upon request.

Die Making Machines: How dies, templates, gages, etc., can be sawed out, filed, and lapped easily and accurately on Oliver die making machines is fully described in a bulletin issued by the Oliver Instrument Company, 1430 Maumee Street, Adrian, Mich. Mailed upon request.

Self-Tapping Sheet Metal Screws: Screws which are threaded and hardened in such a manner as to enable them to cut their own threads as they are screwed into sheet metal assemblies are described in a folder which is published by the Parker-Kalon Corporation, 192-196 Varick St., New York City., N. Y. Sent free upon request.

Tapping Devices, Quick-Change Chucks, Stud-Setting Tools and Bench Tappers: A catalog describing the various types and kinds of tapping, drilling, and stud-setting devices manufactured by the Procunier Safety Chuck Company, 12 South Clinton Street, Chicago, Ill., can be obtained without charge by addressing this company. The catalog also tells the part that Procunier tools play in obtaining greater accuracy and less tap breakage.

Engine, Turret, and Gap Lathes are described in a series of bulletins that have been issued by The Rahn-Larmon Co., 2935 Spring Grove Ave., Cincinnati, Ohio.

Pullmore Industrial Clutch: A multiple disc clutch, made in two types, to run in oil or dry, and which is so built that it can be operated at high speeds, is illustrated and described in a folder that will be sent free by the Rockford Drilling Machine Company, Rockford, Ill.

Universal Openside Shaper-Planer: The need of a machine tool to fill the gap between the shaper and the planer has been filled by the development of the Rockford Universal Openside Shaper-Planer, made by the Rockford Machine Tool Co., 2414 Kishwaukee Ave., Rockford, Ill. Full description on request.

Automatic Lubrication: Individually motor-driven pumps that keep the work flooded with lubricant are described in a booklet that has been published by the Ruthman Machinery Co., Front and Pike Sts., Cincinnati, Ohio.

Safety Grinding Wheels: The complete line of grinding wheels made by the Safety Grinding Wheel & Machine Co., Springfield, Ohio, is described in Catalog No. 11, which is issued by this firm. The book also contains instructions for operating grinding wheels, tables of grinding wheel speeds, pulley calculations, and other information for the user of grinding wheels.

Saving Time With Small Tools: A line of time-saving small tools, including "Use-'Em-Up" drill sleeve, "Wear-ever" chucks, collets, cutters, reamers and tap holders, counterbores, spotfacers, and other tools is described in Catalog 36, issued by Scully-Jones & Co., 1909 S. Rockwell St., Chicago, Ill.

Equipment For the Shop: Vises for the bench, drill press, milling machine or shaper; angle plates; adjustable clamps, jacks and other tools for the machine shop, are described and illustrated in a booklet that is published by the Sheldon Machine Co., 3253-55 Cottage Grove Ave., Chicago, Il. Copy free upon request.

"Metal Cutting" is the title of the book that describes the latest methods of cutting metals, and includes descriptions and illustrations of both the band saws and inserted-tooth metal-cutting saws made by the Simonds Saws & Steel Co., Fitchburg, Mass. Copy will be sent free upon application to the firm mentioned.

Shaping with Modern Equipment: The Smith & Mills Company, 2889-91 Spring Grove Avenue, Cincinnati, Ohio, has issued a booklet which describes and illustrates the line of modern shaping equipment made by this firm. Copy free upon request.

Cutting Oil Data: A series of booklets containing valuable information about cutting oils and their uses for thread-cutting, broaching, and general cutting purposes will be sent free to any mechanical executive by D. A. Stuart & Co., 2727 South Troy St., Chicago, Illinois.

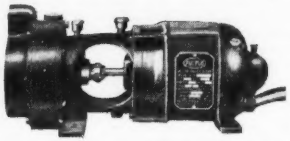
Engineering and Manufacturing Service: A complete engineering and manufacturing service for manufacturers who are not equipped to handle all of their own designing, experimental, or production work is described, with illustrations of the equipment available, in a bulletin that is issued by The Steel Products Engineering Co., Springfield, Ohio.

Flexible Shaft Equipment: The uses of the flexible shaft for drilling, grinding, and other operations is discussed in a booklet which also describes and illustrates the flexible shaft equipment made by N. A. Strand & Co., 5001 N. Lincoln St., Chicago, Ill.

Cutting and Grinding Facts: A discussion of cutting oils and lubricants, together with descriptions and illustrations of various kinds of jobs upon which cutting oils are used, is contained in a booklet that is issued by the Sun Oil Company, Finance Building, Pittsburgh, Pa. Free upon request.

Rigidmilling Principles and Practice: A book that shows how the Rigidmil can be adapted to various kinds of usual and unusual milling operations, and which describes in detail the work that can be handled by this machine has been issued by the Sundstrand Machine Tool Co., Rockford, Ill. Copy free upon request.

Correct Lubrication for Cutting Tools

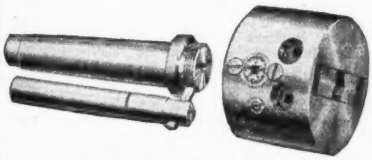


Fulflo pump construction insures a constant and ample flow of coolant to the cutting tools.

The Fulflo pump illustrated is a motor driven grinder pump built in three sizes for various requirements. There is a Fulflo pump to fit your need —write for complete information on the full line of motor and belt driven Fulflo pumps.

FULFLO SPECIALTIES CO., BLANCHESTER, O.

FLYNN MICROMETER OFFSET BORING HEADS



FOR ECONOMY IN PRECISION BORING

The least overhang of any head on the market, yielding utmost rigidity and maximum table travel. Made in a full range of sizes to fit all standard spindles and arbors.

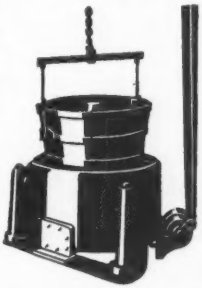
Send for Circular and Price List

J. M. WATERSTON

420 Woodward Ave. Detroit, Mich.

Save Cutting Oil the Economical Way

One 40-inch Tolhurst Chip Wringer will handle more work with much less labor than several small machines. In the 40″ and 48″ Tolhursts, long curly turnings are handled as readily as small chips.



Write for Catalog Today.

TOLHURST MACHINE WORKS, Inc., Troy, N. Y.

New York Office: 30 Church Street
Chicago Office: 8 So. Dearborn St.

The Steel Products Engineering Company

SPRINGFIELD, OHIO

SPECIALISTS IN GENERAL PRODUCTION AND CONTRACT WORK

Aircraft and Machine Gears. Averbeck Shapers.

Quality Drilling Machines: The high-grade drilling and tapping machines made by the Superior Machine Tool Co., P. O. Box 376, Kokomo, Ind., are described and illustrated in a booklet that will be sent free upon application to this firm.

Precision Measuring Instruments: The gages, micrometers, and other precision measuring instruments made by the Swedish Gage Co. of America, 7310 Woodward Ave., Detroit, Mich., are fully described in an interesting booklet that has been published by this firm. Copy free upon request.

Save Cutting Oil: How cutting oil can be separated from chips and thus reclaimed by the use of a centrifugal chip "wringer," is told in a bulletin that is issued free by the Tolhurst Machine Works, Troy, N. Y.

Chuck With Air: How time and labor can be saved by the use of air-operated chucks, cylinders, and other equipment is told in a book which describes "Hopkins" Air-Operated Equipment. Published by The Tomkins-Johnson Company, 620 N. Mechanic St., Jackson, Mich. Sent free upon request.

A Simplified and Improved Drive Control for Machinery: Two distinct types of plate clutches that have proved successful highly in the driving mechanism of machine tools are described and illustrated in a bulletin that will be sent free by the Twin Disc Clutch Company, Racine, Wis.

Powerful, Easy-Acting Chain Hoists of the most modern design are described and illustrated in a booklet that is issued by the Union Manufacturing Co., 296 Church St., New Britain, Conn. Copy free upon request.

Multiple Drilling With a Single-Spindle Drill: Methods by which multiple drilling may be done on a single-spindle drill, using multiple spindle drill heads, are discussed in a bulletin that is issued by The United States Drill Head Co., 1954 Riverside Drive, Cincinnati.

Electrically-Driven Portable Tools: The "U. S." line of electric drills, die grinders, electric screw drivers, surface grinders, tool post grinders, and bench and floor grinders is described in Catalog No. 24, which has been published by The United States Electrical Tool Co., 2471 W. Sixth St., Cincinnati, Ohio.

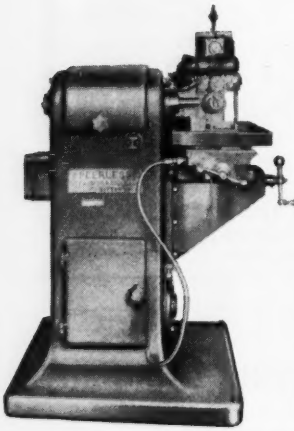
Van Norman "Duplex" Milling Machine: A milling machine especially adapted for a wide range of operations on tools, dies, jigs, gages, and general utility purposes is described and illustrated in a booklet which has been issued by the Van Norman Machine Tool Co., 150-200 Wilbraham Ave., Springfield, Mass. Copy free upon request.

"Wedge-Lock" Multiple Bit Tool Holder: A new type of tool holder, in which the tool bit is held by the action of a wedge, is described in a bulletin which will be sent free upon request by the Wedge-Lock Tool Co., 549 W. Randolph St., Chicago, Ill.

Shop Furniture: A catalog describing and illustrating all kinds of shop furniture, including benches, vises, steel stands, foremen's desks, chip trucks, steel racks for bar stock, steel tote boxes, and other equipment will be sent free upon application to The Western Tool & Manufacturing Co., 1620 East Pleasant Street, Springfield, Ohio.

Hardness-Testing With Accuracy and Speed: The principles of testing for hardness by the use of the Rockwell Hardness Tester are discussed in a booklet which also shows a number of applications of this instrument, published by the Wilson-Maeulen Co., Concord Ave. and 143rd St., New York, N. Y. Sent free upon request.

Tool Chests for Machinists and Toolmakers: The complete line of fine tool chests for machinists and toolmakers made by J. M. Waterston, 420 Woodward Ave., Detroit, Mich., is described in Catalog No. 25. Ask for it.



THE AIR EQUIPPED

PEERLESS

CHAMFERING MACHINE

will cut a rounded ball point, a straight 45 degree chamfer, or any other chamfer or roundness with equal ease.

It is equipped with air cylinder to eliminate the slow hand method of mounting the work and will increase production 20 per cent to 30 per cent.

No user of tooth chamfering equipment can afford to overlook the Flexibility of the Peerless Tooth Chamfering Machine. Send for circular.

CITY MACHINE & TOOL WORKS

5 North June St. DAYTON, OHIO

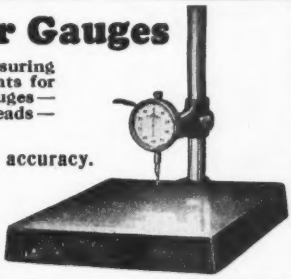
THE SHOPMARK OF PERFORMANCE CM&T

Ames Micrometer Gauges

For almost every testing and measuring requirement—Precision Instruments for laboratory use—Upright Dial Gauges—Thickness Gauges—Dial Gauge Heads—Pocket Gauges—Comparators.

Precision with speed and extreme accuracy.

Send for complete information about them.



B. C. AMES CO., Waltham, Mass.

902 Stephenson Bldg., The Boulevard at Cass Ave., DETROIT, MICH.

No Time Wasted

Adjusting the

RAPID

Drop Forged Steel

CLAMP

Just pull the trigger, set the ram, and give the screw a turn to obtain the necessary pressure. Unequalled for speed and rigidity. Made in three sizes—4 in., 6 in., and 9 in.

EVERY CLAMP WARRANTED

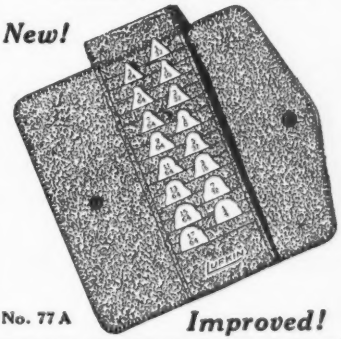
FOUNTAIN EQT. & MFG. CO.

2025-9 Elm Street Cincinnati, Ohio

LUFKIN

RADIUS GAGE

New!



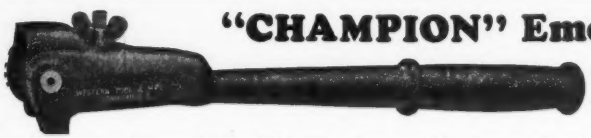
No. 77 A *Improved!*

Sixteen Gages, each marked with radius. External and internal form on same gage. Assembled in neat folder.

Send For Catalog

THE LUFKIN RULE CO.

SAGINAW, MICH.



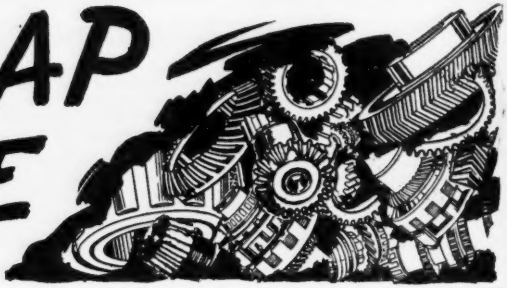
"CHAMPION" Emery Wheel Dressers!

Champion Emery Wheel Dressers are built for quick action. The cutters are made of a special steel, heat treated and tempered after they are formed, and will sharpen a dull or glazed wheel faster than any other method.

Send for Details NOW!

THE WESTERN TOOL & MFG. CO., Springfield, Ohio

THE SCRAP PILE



By GEO. ALEXANDER MANN

Poor Alburtus

Here lies the crumbling bones
O' ol' Alburtus Hind;
While usin' a revolving door,
The poor sap changed his mind.

Bath houses are responsible for lotsa comic strips.

The trouble with bein' tied to friend frow's apron strings—it's only a question o' time till she hands you the apron with a dish towel for good measure.

Intelligent Question No. 10878

"It's in a boiler factory,"
Said Henry, "That I toil."
An' Liz said, "Oh, how thrilling,
What is it that you boil?"

Ain't Ut Hull?

In usin' the car to town it's hard to figure which is mo' expensive—the cost o' the gasoline to the parkin' space or the taxi fare from there on in.

The delicatessens are responsible for our can to mouth existence.

Got a Taunt Comin'

About his new girl baby,
The druggist's bein' taunted;
For weeks an' weeks he's had
A sign out front, "Boy Wanted."

With so dern many automatic devices, 'bout the only way a woman can keep the home in operation is to marry a master mechanic or an electrical engineer.

Oh, Mame—Calm Yourself

Mame cried, "Give me men,
All else you can take;
What a whale o' diff
Just a few gents make."

Seem To Be Hard To Convince

Marriage may be a failure—but for some folks it takes two or three marriages to prove it.

Some o' our statesmen almost make us wish they'd go out an' buy some insect powder an' commit suicide.

Then It Hits Him

"Inferiority complex"
A crook don't know until
He opens up his mail
An' finds his dentist bill.

The ol' rum hounds don't seem to miss the good stuff much so long as they find the toot in substitute.

Oh, Paw—Shame

Paw says any change for some married men will be so welcome that, be it heaven or hell, it won't make any difference.